ELECTRICAL REVIEW

and WESTERN ELECTRICIAN with which is consolidated ELECTROCRAFT

VOL. LXIII, No. 11. CHICAGO, SATURDAY, SEPTEMBER, 13, 1913. ISSUED WEEKLY.

COMPRISING

ELECTRICAL REVIEW WESTERN ELECTRICIAN ELECTROCRAFT

ELECTRICAL REVIEW PUBLISHING COMPANY

608 SOUTH DEARBORN STREET
CHICAGO

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SUBSCRIPTIONS.

One Year, United States.....$3.00
One Year, Canada.....4.00
One Year, Foreign Countries.....6.00
Single Copy, 10 cents. Back numbers, beyond one month, each .25

Entered as second-class matter, November 7, 1908, at the Post Office at Chicago, Ill., under the Act of March 3, 1879.

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FIRST-AID PREPAREDNESS.

The attention which has recently been given to the prevention of loss of life from electrical causes is a most admirable feature of the development of the electrical industry and must be reassuring to those who have feared that the modern scramble for the almighty dollar has overshadowed the importance of protecting human life.

This tendency has been manifested in many ways. The appointment by the National Electric Light Association of a Committee on Resuscitation from Electric Shock and the publication by this committee of rules of procedure has had a wide effect in educating the rank and file of those employed in the industry as to the proper measures to be taken when shock has occurred. The United States Government has recently given some attention to this matter and made an appropriation for an investigation into the conditions surrounding high-tension lines. This investigation is now in the hands of the Bureau of Standards, and, as announced some weeks ago, Mr. W. J. Canada, who was formerly engineer for the Rocky Mountain Fire Inspection Bureau, has been appointed to carry on the work. The National Electrical Code, which was originally drawn up by the fire-insurance interests with the sole idea of reducing the fire hazard, now shows a tendency to broaden its scope, and since its purpose and control are no longer restricted to fire insurance alone, we may look for the gradual introduction into its provisions of measures intended to secure the safety of persons as well as of property.

That in the past the loss of numbers of lives from electrical causes might have easily been prevented will not be denied. In some cases such fatalities have been due to lack of proper preventive measures. This has sometimes been due to faulty design and installation; sometimes to failure to provide the necessary protective devices, and sometimes to gross negligence upon the part of those in charge of operation. Many other lives have been lost through ignorance of the proper method of handling persons subjected to shock. We occasionally hear instances of death due to comparatively low voltages and it may be that these have been due merely to a failure to apply proper means of resuscitation. On the other hand, many cases of shock from high voltages are known where the results have not been fatal. While large differences in the resistance of different persons are apparent, it is evident

that the human organism can in many cases withstand the effects of shock at fairly high voltage. In one recent case, contact at 33,000 volts resulted merely in bad burns.

Another instance of this kind is reported from Winnipeg, where a workman employed at a cement mill was cleaning the gaps of a lightning arrester installation on a 2,200-volt alternating-current circuit. Although a disconnecting switch had been opened, one side was still alive, and for some unaccountable reason the man placed one hand upon this live side of the switch while the other was in contact with the lightning arrester. Although rendered unconscious, he later revived and walked outside of the building, where he soon received attention. In this case the thumbs on both hands were found to be severely burned and one of them was entirely lost, but aside from this the victim completely recovered.

The general interest which central-station officials are taking in this matter is gratifying, and it is becoming common practice to not only distribute wall-hangers and call the matter to the attention of employees, but to form classes for regular instruction and demonstration of the resuscitating process. It is well to stimulate interest along this line, and one means of doing this is by competitions between teams from the various departments of an operating company. There should be no case of shock to a workman either in a central station or an industrial plant where his fellow workers are not prepared to at once carry out the most approved methods of first aid.

CHOOSING THE MOTOR.

Salesmen for machines of various kinds are prone to belittle the power requirements of a machine, expecting to create a favorable opinion for their wares on the score of low cost of operation. Customers unfamiliar with engineering principles are sometimes misled by such claims, not realizing that the operation performed necessarily requires a certain expenditure of energy, and that no matter how efficiently the machine may operate, there is an irreducible minimum to the power required. Of course, there is friction in the machine and this will cause waste. Different machines for performing the same operation may have different efficiencies and thus different power requirements, but it should be realized that a certain amount of power expenditure is essential, and extravagant claims should be discounted.

In selecting motors for machine operation this should be realized, and little dependence placed upon salesmen's figures unless backed up by definite statements printed in catalogs or by guarantees of performance. Even when honestly made, such claims are subject to variations in the material used in manufacture. Thus in a woodworking machine the power requirements will vary greatly with the hardness of the wood, and in a sewing machine with the thickness of the cloth used.

The safest procedure, where measurements of power are not already on record, is to connect a motor temporarily, and make electrical measurements of the power supplied. A suitable motor can then be selected, and it is important to choose the proper size. If too small a motor is installed, there are likely to be burnouts, stalling at embarrassing times, and other trouble. If the motor is too large, first cost is unnecessarily high, efficiency is sacrificed, power-factor may be low, etc. Central-station solicitors should endeavor in all cases to see that machines are properly motored, as this will add greatly to the satisfaction with an installation.

CAMP CO-OPERATION.

"They're crazy, they can't get together, that's why they're here." According to Elbert Hubbard the badge of sanity is the ability to get together—to co-operate. The expression at the opening of this paragraph is related of a keeper of an insane asylum in answer to Mr. Hubbard's question as to whether he was not afraid that his twenty-five patients would combine to do him some injury. In scorn he answers, "They're crazy, they can't get together, that's why they're here."

Under the auspices of the Association Island Corporation there was held last week at Henderson Harbor, N. Y., a very important and significant gathering of electrical men. A report of the proceedings of this meeting is published on other pages of this issue. It is not possible in the confines of a report of this nature to reveal all that transpires at a convention of this character. Only those points which make the most definite impression and which are perhaps easiest of assimilation can be recorded by the observer in the swift procedure which attends the spontaneous outpouring of enthusiastic utterance such as marked both the formal sessions and the informal discussion during the days so pleasantly and profitably spent at this beautiful island in Lake Ontario. It is to be hoped, therefore, that when after due editing and proper preparation the full report of this meeting shall be available that there will be a widespread distribution so that everyone interested in the development of the electrical industry might be reached and influencd by a careful study of this inspiring record of harmony and co-operation.

The gathering at Association Island represented a further effort to bring together the leading men representing the various elements of the electrical industry to co-ordinate their ideas, to amalgamate their influences, and to establish a happier basis for mutuality in carrying forward the work of the day in our business. One of the concrete evidences of the spirit of co-operation which has come about as a result of the previous meetings held under the same auspices is found in the report of Mr. J. M.

Wakeman, general manager of the Society for Electrical Development, to the effect that of the $200,000 which the Society proposes to establish as a minimum basis upon which to begin its propaganda for the development of the industry, approximately $140,000 had been pledged. The Jovian Order, with its 11,000 active members of the industry available, is at work spreading the gospel of harmony and co-operation, and it is expected that within the next 60 days subscriptions will have been secured making the minimum fund available. As another evidence of concrete gains for harmony and co-operation there was the report of Mr. Ernest McCleary, representing the National Electrical Contractors' Association, to the effect that at the recent conventions of the Electrical Supply Jobbers' Association and the National Electrical Contractors' Association, the right hand of fellowship had been exchanged, and that representatives of both organizations had had a prominent part in the programs of each other. Also, that the contractors of the country had responded to the invitation to join with the Society for Electrical Development, and led in point of numbers in the subscriptions.

There is much that may be accomplished by the bringing together of the influential men of the industry and the inspiring by them of their constituents to adopt as far as is economically possible, the ideas of harmony and co-operation. It is when men meet on common ground, and for the good of all unselfishly attempt to sink their individual opportunities for gain at the expense of one another, that all will rise above the level of dissatisfaction and discontent. The suggestion made by Mr. D. L. Gaskill, secretary of the Ohio Electric Light Association, that the state associations devote a session at their convention to the discussion of means for greater co-operation in their respective localities, is a good one, and the example of the Ohio Electric Light Association will no doubt be followed by many others.

There is a feeling that these conferences, which have been due to the courtesy and generosity of the Association Island Corporation, be made a permanent annual feature, and that the presidents of the local societies and associations throughout the country be invited to attend each function. The recognition of the leaders of the electrical men in the various communities as representatives in attendance at so significant and important an occasion as this has become, ought to inspire the best men everywhere to strive for leadership. As the idea is developed, therefore, these meetings will become more and more representative of the greatest advancement in ideas and ideals, and through its agency the master minds of the industry will contribute in an accelerated measure to the development of our business and the conferring of untold benefits upon all mankind.

ENCOURAGING THE USE OF ELECTRICITY.

A practical and effective method of advancing the interests of the electrical industry is for every worker in this great branch of the world's activities to acquire the habit of patronizing concerns using electrical service and apparatus in their business in preference to dealing with less progressive houses. Nothing like the full possibilities of this policy are today realized. In small places the choice of concerns in different lines is often too limited to enable this plan to be tried out; but certainly in all cities provided with central-station service it is possible to trade with business houses which are users of electricity rather than those depending upon less modern means. Let every one interested in electrical development make a point of encouraging the use of electric lighting, the equipment of delivery departments with fleets of electric trucks, and the use of motor-driven refrigerating plants, cash-carriers, meat-choppers, coffee grinders, etc. Let the man and woman whose living comes from electricity be free to speak a good word for its use now and then at the propitious time, with interest enough in the matter to let those who work behind desk or counter know that the progressiveness of their house in using electrical service is one reason for their getting the business. The buying power of the electrical workers of the country is enormous, and if directed consciously into channels where those catering to the personal needs of these men and women are made to see wh the business comes their way, the resulting stimulus to the electrical industry will be nothing less than astounding.

Thus, if an electrical factory worker, telephone or electric railway man is led to patronize a restaurant some evening through its effective electric sign, let him casually mention the fact to the proprietor or cashier, asking perhaps if the establishment does not utilize electricity in its kitchen. Or again, the electric lighting of a shoe store may be noteworthy. Here is the opening for favorable comment in connection with a purchase, and under circumstances when a good word commands attention and respect. There is all the difference in the world between getting the ear of the man with something to sell and trying to make a similar impression upon the man to whom one wishes to sell something. Every electrical worker has it in his power to strike home some telling facts about modern lighting and power if he makes use of his opportunities. Even the Italian shoemaker with a motor-driven grinder and polisher, the Greek fruit dealer with a high-powered tungsten lamp above his outdoor display, and the Chinese laundryman with an electric fan and flat iron are keen to note the appreciative comment of a customer who sees that their equipment is modern, and in countless cases the whole thing can be accomplished without the least need of the customer's identifying his relations to the industry. Merchants are pretty sensitive in these days to the casual, courteous remarks of their patrons, and the electrical man has a chance to help that industry at very little trouble to himself.

Program for Kansas Convention.

The sixteenth annual convention of the Kansas Gas, Water, Electric Light and Street Railway Association will be held at Hutchinson, Kan., on October 9, 10 and 11. The first session will be held on the afternoon of October 9. There will be an address of welcome by the mayor of Hutchinson, a response by B. F. Eyer and the presidential address by L. O. Ripley. The following papers will be presented: "The Cost of Distribution versus Cost of Production," by J. R. Murphy; "The Relation of the Load-Factor to the Net Revenue of the Average Kansas Central Station," by F. F. Rossman; "Pumping Water for Municipalities," by M. Dunsworth; "Treatment of Poles," by F. B. Uhrig.

In the evening P. Lloyd Lewis will make an address on the Jovian Order and this will be followed by a smoker and entertainment.

At the morning session on October 10 the following papers will be presented: "Manufacture and Installation of Concrete Poles," by C. L. Brown; "Some Features in the Organization and Development of an Interurban Railroad," by Charles D. Bell; "Some General Features which All Public Utilities Have in Common," by A. M. Patten; "Small Central Heating Plants," by H. C. Kimbrough; "Intangible Values and Their Relation to the Valuation of Public Utilities," by George C. Shaad; "Special Street Illumination with Ornamental Concrete Posts," by F. A. Pielsticker. L. M. Gazen will also read a paper on a subject not yet announced.

At the afternoon session on October 10 the following papers will be presented: "The Relation of Public Utilities to the Public," by Henderson S. Martin, chairman of the Kansas Public Utilities Commission; "Financing of Public Utilities," by H. P. Wright; "Some of the Important Factors in the Development and Transmission of Natural Gas," by C. L. Bullock.

In the evening there will be an executive session, followed by the Question Box, which will be conducted by W. E. Sweezey.

The last session will be held on the morning of October 11 and the following papers will be presented: "The Design and Construction of High-Tension Distributing Systems," by G. W. Sathoff; "Irrigating Kansas Lands," by H. B. Walker; "Determining Operating Costs of Power Installations," by C. A. Fess. There will also be a talk on "The Education of the Central-Station Staff in Kansas," by P. F. Walker, of the State University of Kansas.

The secretary of the Association is Ivor Thomas, Wichita, Kan.

Radio Engineers Start Fall Meetings.

The Institute of Radio Engineers held its first meeting for the present season at Columbia University, New York City, on Wednesday evening, September 3. Vice-President Marriott commented on the practical achievements of radio workers during the summer, and announced the incorporation of the Institute under the laws of New York State. The list of active members now numbers well over two hundred, and includes many prominent radio engineers in England and the European continent, as well as in Australia, Africa and South America.

An interesting and well illustrated paper by Hans Rein, of the Lorenz Company, in Germany, describing the theory and apparatus of the "Multitone System," was read by Dr. Goldsmith, and was followed by a long discussion.

Dam at Long Sault Opposed.

The proposed scheme of the St. Lawrence Power Company to dam the St. Lawrence River at the Long Sault Rapids for the purpose of generating power has been opposed in a report of the Canadian Conservation Commission, recently made public. This subject has been agitated for three years, a bill having been introduced into the Canadian Parliament in 1910 authorizing the project. The legislature of New York State, which had granted a charter to the company, later revoked it.

Water-Power Policy to Be Discussed at Chicago.

At the next meeting of the Western Society of Engineers to be held in the Monadnock Block, Chicago, on the evening of September 15, M. O. Leighton, of Washington, D. C., will present a paper entitled "The Water-Power Policy of the United States."

Electrotherapeutic Congress.

The American Electrotherapeutic Association opened its twenty-third annual meeting in the Engineering Societies Building, New York City, on September 2. Many prominent physicians from England, Germany, France and this country attended the sessions.

White Way for Yonkers.

On September 3 there was a celebration at Yonkers, N. Y., of the completion of the ornamental street-lighting installation which has been provided for the business district; 150 new posts have been set up, each carrying four 60-watt and one 100-watt tungsten lamps.

Program of New England Convention.

The fifth annual convention of the New England Section of the National Electric Light Association will be held at the Hotel Vermont, Burlington, Vt., on Wednesday, Thursday and Friday, September 17 to 19. The annual meeting of the Vermont Electrical Association will be held at the same time.

There will be an informal reception and dance on Wednesday evening in the roof garden of the hotel. Sessions for the presentation of papers will be held on Thursday morning, Thursday afternoon, Thursday evening and Friday morning. On Friday afternoon there will be a steamboat excursion to Blue Point and an informal dinner will be held at 6 p. m. at that place, the return trip being made in the evening. On Saturday morning special cars will leave the hotel for Essex Junction to visit the new hydroelectric plant of the Burlington Light & Power Company.

The following papers will be presented at the first session on Thursday morning, following the president's address and the reports of officers: "Problems of Central-Station Managers in Cities of Less Than Five Thousand Inhabitants," by A. B. Marsden, Manchester, Vt.; "Principles Governing Central Stations in Line Extensions and Various Rulings of Commissions Thereon," by Alexander Macomber, Boston, Mass.

The following papers will be presented on Thursday afternoon: "Some Phases of the Merchandising of Electric Appliances," by W. G. Stetson, of the Edison Electric Illuminating Company, Boston; "The Value of the Electric Vehicle to the Central Station," by W. H. Snow and David W. Beaman, of the New Bedford Gas & Edison Light Company.

On Thursday evening there will be a symposium on the subject "Co-operation of Allied Electrical Industries." S. St. John Morgan, of the Westinghouse Electric & Manufacturing Company, will speak for the manufacturers; W. J. Keenan, of Pettingell-Andrews Company, for the jobbers; J. G. Gilliland, of the New England Engineering Company, for the contractors; and Francis A. Gallagher, Jr., of the Narragansett Electric Lighting Company, for the central stations. The discussion will then be open to all.

At the session on Friday morning the election of officers will take place and the following papers will be presented: "The Relation of the Central Station to Its Customers," by J. T. Shannon, of the United Electric Light & Water Company, Waterbury, Conn.; "Lamp Voltage and Socket Voltage," by Henry Schroeder, of the General Electric Company, Harrison, N. J.

Electricity in the Manufacture of Trunks and Suit Cases.

In the manufacture of trunks and suit cases comparatively little power is used as most of the work is done by hand. Nevertheless it is essential that even the small amount needed be absolutely reliable, due principally to the high labor cost in this industry. There are other equally important requirements of operation in trunk and suitcase factories that make electric drive with central-station power particularly advantageous in this field.

In general these advantages, which are being so universally recognized, and which apply in so many industries, apply with equal importance to trunk and suit-case factories. Individual drive, even on sewing and stitching machines, is, of course, to be preferred and many progressive managers are so equipping their plants.

Comparatively little power is used in the manufacture of trunks and suitcases, yet the advantages of motor drive which are being so universally recognized and which apply in so many industries, apply with equal importance to this business. These advantages and the power requirements of the various machines used are discussed in this article.

Group of Individually Driven Skiving Machines, Stitchers and Sewing Machines at Imperial Leather Manufacturing Company's Plant, Chicago.

The arguments in favor of individual motor drive are numerous, but most of those relating to suit-case plants can be classified under the following heads: (1) ease and economy of electric-power transmission; (2) flexibility of location of machines in the building; (3) accessibility of motor-driven machines; (4) wide choice of motors as to size, mechanical design, and operating characteristics; (5) perfect control, including readiness of starting, stopping and making speed adjustment; (6) economy of power and time; (7) ability to operate any portion of a shop at any time with power consumption proportional to work done; (8) reduced hazard of accident.

A brief discussion of the advantages, in the order named, may prove of interest.

Industrial work generally requires the application of power at distributed points. No form of prime mover is available which can economically develop power in small quantities at the points of application. The electric motor furnishes the nearest approach to this condition in that electric energy can be economically transmitted and transferred into mechanical energy at the point of application in any quantity desired. When compared with line shafting and belts, the installation of wires for carrying electric current is a very simple and inexpensive operation; in comparing the relative losses in transmission the electrical losses seem almost insignificant.

With electric drive the location of

buildings and of the individual machines in a shop is practically unhampered by consideration of power. Buildings can be placed with reference to good labor and transportation facilities, convenience with reference to each other, safety from fires or other disasters, etc., in any case electric energy is easily brought to the required location, the necessary wires being easily installed in space not valuable for other purposes. The machines in a plant can be placed so as to require minimum handling of material and to obtain most economical production; also, better light and ventilation can be given proper consideration. No matter how remote or inaccessible the corner in which the work is to be done, the motor-driven machine can fill the requirements.

The flexibility extends to the re-arrangement of machines to conform to changing manufacturing requirements. A motor-driven machine can be moved from one location to another as a unit without disturbing or interrupting any other machines. The only changes required on account of the power supply are the disconnection of the electric conductors in the old location and their reconnection after the machine is moved. This process is extremely simple compared with that of relocating line shafts and belts. The best arrangement for maximum productive economy can thus be maintained, under changing manufacturing conditions.

Additions to plants employing motor-driven machines and central-station service require very little consideration on account of power, other than the wiring.

With motor drive the machines become more accessible and the operators are unhampered by the close proximity of countershafts and overhead belts. This is particularly important in trunk and suit-case plants on account of the size of the product handled. Freer head room also permits easier handling and storage of material.

Electric motors are standardized in sizes, shapes and with operating characteristics suitable for almost every conceivable application.

By the use of a motor for each machine any machine can be shut down when not in use, thus stopping all wear and loss of power in friction. This is not the case with the line-shaft drive, as the wear and the friction losses in the shafting are only slightly less when all the belts are on their loose pulleys than when all the machines are working. This possibility of saving power with motor drive is an argument for the use of individual motors on the various machines or

1.5-Horsepower Motors Driving Double Scoring Machines at Imperial Leather Plant.

groups of machines. Each machine thus driven is an independent unit; group drive makes each group totally independent of all other groups. Hence in the case of over-time work, only the machinery required need be operated.

Speed adjustment with motor drive is a simple matter, and a motor can be selected such that the speed at any adjustment will be practically constant at all loads. This feature enables a machine to be operated always at the most economical speed. A simple movement of a controller handle at any convenient point near or remote from the motor, changes the speed instantly, and the number of possible speeds can be made as large as desired. Moreover these conditions remain the same during years of service. With mechanical transmission the number of speeds is comparatively small and the speed increments large; moreover, the change of speed is troublesome, and workmen are often tempted to operate with uneconomical speed rather than change it.

A motor-driven machine consumes energy only while operating, and then only in proportion to the work done. Electric motors are very efficient ma-

Two 0.25-Horsepower Motors Each Driving a Glueing Machine at Imperial Plant.

Trunk and Suit Case Manufacturing Data—Sheet No. 1.

The term load-factor is used in these data in such a sense that a load-factor of 100 per cent represents the use for 24 hours every day of power corresponding to the rated capacity of the motors connected. An operating-time load-factor of 100 per cent represents the use of the rated capacity of the motors for the running hours per day specified for each installation.

Trunk factory manufacturing an average of 4,000 trunks per month. There are 18 men employed working 10 hours per day.

Total connected horsepower, 21. Total number of motors installed, 4. Average kilowatt-hours per month, 1125. Kilowatt-hours consumption for 12 months.

Month	Kilowatt-Hours	Month	Kilowatt-Hours	Month	Kilowatt-Hours
January	1,299	May	1,055	September	1,610
February	1,464	June	1,268	October	1,077
March	1,056	July	1,245	November	1,168
April	1,076	August	1,190	December	1,125

Load-factor, 10 per cent; operating-time load-factor, 20.6 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives the supply source is three-phase, 60 cycles, 220 volts. Motors are of the squirrel-cage induction type.

No.	Horse-power	Speed R. P. M.	Application.
1	10	1,700	Belted to a 30-foot shaft driving one Luther gang rip saw, three 9-inch saws; one Fay 14-inch rip saw; and one Luther gang cut-off saw, three 14-inch saws.
1	5	1,700	Belted to a 40-foot shaft driving one end-stapling machine; one special dado; and one glueing machine.
2	3	1,700	Each back-geared to a National box-blank machine.

Trunk and suit case plant manufacturing about 10,000 trunks and 2,300 suit cases per year. There are 60 men employed working 10 hours per day.

Total connected horsepower, 18. Total number of motors installed, 3. Average kilowatt-hours per month, 302. Kilowatt-hour consumption for 12 months:

Month	Kilowatt-Hours	Month	Kilowatt-Hours	Month	Kilowatt-hours
January	187	May	297	September	359
February	285	June	338	October	311
March	233	July	335	November	352
April	280	August	354	December	283

Load-factor, 3 per cent; operating-time load-factor, 6.5 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts. Motors are of the squirrel-cage induction type.

No.	Horse-power	Speed R. P. M.	Application.
1	7.5	1,120	Belted to a 35-foot shaft, three hangers driving one Presto 3-inch by 36-inch three-roll straightening roll for flattening tips after pasting linings on trunk covers; one six-inch double emery and buffing wheel; one sensitive drill; one strap creaser for putting ornamental creases on leather straps; one Neuman corner-cutting machine, fly-wheel 16 inches diameter; one standard sewing machine; one punch press, flywheel 14 inches diameter; one leather creaser for suit-case sides; two Neuman heavy duty sewing machines; and one Neuman glueing machine, two rolls 8.5 by 36 inches.
1	3	1,700	Belted to a 12-inch combination rip and cut-off saw.
1	7.5	1,120	Belted to a Haughton 2,000-pound elevator, 30 feet per minute.

Suit-case and trunk factory having an average output of two dozen suit-cases and 150 trunks per day. Plant operates 60 hours per week.

Total connected horsepower, 11. Total number of motors installed, 3. Average kilowatt-hours per month, 714. Kilowatt-hour consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	767	May	746	September	700
February	794	June	717	October	650
March	819	July	719	November	725
April	778	August	676	December	725

Load-factor, 12 per cent; operating-time load-factor, 26 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts.

No.	Horse-power	Speed R. P. M.	Application.
1	3	1,200	Belted to a line shaft driving two skiving machines; three strap cutters; one corner press; and six leather stitching machines.
1	3	1,200	Belted to a line shaft driving one punch press; one Neuman glueing machine; one leather creaser; one straightening roll; and one emery wheel.
1	5	1,800	Belted to a line shaft driving one 12-inch combination rip and cut-off saw; one band saw; and one corner-cutting machine.

Trunk and Suit Case Manufacturing Data—Sheet No. 2.

Imperial Leather Manufacturing Company, Chicago. This company manufactures suit cases and traveling bags exclusively, and has an average output of 2,500 per week of 54 hours.

Total connected horsepower, 25.25. Total number of motors installed, 24. Average kilowatt-hours per month, 628.

Kilowatt-hour consumption for 12 months:

Month	Kilowatt-Hours	Month	Kilowatt-Hours	Month	Kilowatt-Hours
January	598	May	600	September	628
February	672	June	499	October	664
March	703	July	483	November	767
April	654	August	540	December	736

Load-factor, 4.6 per cent; operating-time load-factor, 18 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is 200 volts, direct current.

No.	Horse-power	Speed R. P. M.	Application.
2	0.125	1,800	Each belted direct to a Puritan high-post sewing machine.
1	0.25	1,650	Belted direct to an Alligator sewing machine.
1	0.125	1,800	Belted direct to a Singer sewing machine.
2	0.125	1,200	Each belted direct to a Campbell sewing machine.
3	0.25	1,800	Each belted direct to a Singer machine.
1	0.25	1,800	Belted direct to a Puritan suit-case sewing machine.
2	0.5	1,750	Each belted direct to a Fortuna skiving machine.
2	0.5	1,600	Belted direct to a creasing machine.
1	2	1,200	Belted to a Jones No. 52 band saw for cutting felt paper.
1	2	1,100	Belted direct to an E. E. Spencer corner press.
2	0.25	800	Each belted to a glueing machine.
1	1.5	875	Belted direct to a Hobbs double scoring machine.
2	1	900	Each belted direct to a Hobbs corner cutter.
1	0.5	1,600	Belted to a line shaft, driving three Randall and two Spencer strap cutters.
1	5	1,650	Geared direct to pump.
1	7.5	.....	Elevator motor.

Suit-case factory having an average output of about 500 suit cases per month. Traveling bags, etc., are also made in limited quantities.

Total connected horsepower, 14. Total number of motors installed, 4. Average kilowatt-hours per month, 581.

Kilowatt-hour consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	682	May	636	September	577
February	761	June	406	October	483
March	773	July	487	November	555
April	436	August	580	December	598

Load-factor, 7.7 per cent; operating-time load-factor, 16 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is 220 volts, direct current.

No.	Horse-power	Speed R. P. M.	Application.
1	1	1,800	Belted to short line shaft driving four sewing machines.
1	10	1,600	Belted to line shaft driving three stuffers; and one leather press.
1	1	1,100	Belted to a line shaft driving five leather stitchers.
1	2	1,800	Belted to a line shaft driving six leather creasers; two glue rollers; one staple machine; and one press.

Exclusive suit-case manufacturing plant making a line of high-grade suit-cases only. Plant operates 10 hours per day.

Total connected horsepower, 10.5. Total number of motors installed, 2. Average kilowatt-hours per month, 935.

Kilowatt-hour consumption for 12 months:

Month	Kilowatt-hours	Month	Kilowatt-hours	Month	Kilowatt-hours
January	560	May	1,194	September	941
February	646	June	1,174	October	921
March	1,100	July	1,174	November	662
April	1,249	August	1,040	December	548

Load-factor, 16 per cent; operating-time load-factor, 34 per cent.

MOTOR INSTALLATION.

The following is a list of the motors installed with their respective drives. The supply source is three-phase, 60 cycles, 220 volts:

No.	Horse-power	Speed R. P. M.	Application.
1	3	1,800	Belted to a short line shaft driving a battery of six heavy-duty sewing machines; two skiving machines; and three strap cutters.
1	7.5	1,200	Belted to a line shaft driving two glueing machines; one leather creaser; one corner cutter; one corner punch; one band saw, and one emery wheel.

chines in all sizes and at all loads within the ordinary working range, which is more than can be said of any small prime mover. The use of motors, moreover, eliminates some or all the losses due to friction of line shafts and belts. These losses consume anywhere from 30 to 60 per cent of the energy required to operate an ordinary shaft-driven shop or mill, and they are continuous, even though only a few of the machines are operating. As very few machines are in actual service more than half of the time, the cessation of all energy losses chargeable to each machine, except while it is in productive operation, constitutes a very large saving in power.

In plants manufacturing suit cases and traveling bags the principal demand for power comes for driving sewing and stitching machines. Cutting and assembling is usually hand work. In general where there are a number of sewing machines on somewhat similar work, group drive is preferable. Tests show that a group drive of ten sewing machines in the average factory takes one horsepower. If individually driven each machine should be equipped with a one-sixth-horsepower motor. While the load-factor on a single sewing machine is low the load-factor on a group drive motor is high. This is due both to the approximately regular periods at which each machine is working and to the flywheel effect of the rotating parts.

1.5-Horsepower Motor Driving Creasing Machine at Imperial Plant.

Slow-speed motors, either alternating-current or direct-current, should be used and should be direct-connected to the shafting driving the machines. These motors should run at approximately 500 revoultions per minute. This arrangement is by far the simplest and most satisfactory. The accompanying recommendations for horsepower are taken from actual tests.

Machine.	Horsepower Required.
Sewing machines	0.1 to 0.2
Goodyear Rapid Stitcher	0.4
Atlas stitching machine	1.3
Hercules stitching machine	0.8
Automatic stitching machine	0.9
McKay stitcher	0.2
Puritan stitcher	0.2
Skiving machines	0.1 to 0.3

In trunk factories the operations involved are very similar to box factories and the machines employed come under the same category.

Nearly every type of machine found in either a trunk or suit-case factory runs at constant speed. For this reason either alternating or direct-current motors can be used to advantage, although it is evident that as most of the motors used are not larger than five horsepower, the extreme simplicity of control of the induction motor is a strong point in its favor. Small induction motors are started by simply closing a switch.

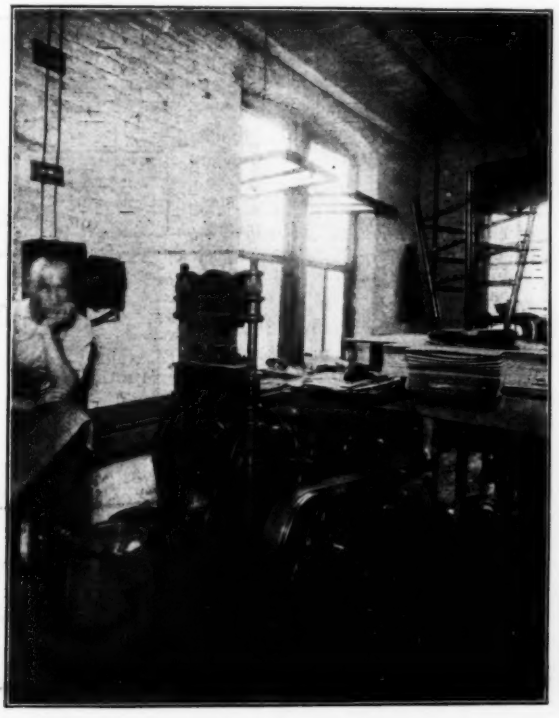
Central-Station Current for Brooklyn Post Office.

A contract has been made by the Edison Electric Illuminating Company of Brooklyn with the United States Government for the supply of light, heat and power for the Brooklyn Post Office, in which an isolated plant had been previously operated.

The equipment replaced consists of two 50-kilowatt and one 75-kilowatt generators, direct-connected to standard upright automatic engines, and two 12 inch by 20 inch duplex steam-driven air compressors, and one 14 inch by 18 inch duplex air compressor.

The Brooklyn Post Office is a mas- size building covering a whole block.

2-Horsepower Motor Driving Band Saw for Cutting Felt Paper.



2-Horsepower Motor Driving Corner Press at Imperial Plant.

Commercial Practice
Management, Rates, New Business

MECHANICAL DEVICES IN THE ACCOUNTING DEPARTMENT.[1]

By Y. M. White.

In the accounting department of the central station, as in the operating department, mechanical devices that make for more efficient service, greater accuracy and increased economy are being widely used. The Washington Water Power Company, of Spokane, has equipped its accounting department with these devices, the function and operation of which are described herewith.

About ten years before Victor Hugo encountered the carbon copy an English professor of mathematics abandoned in despair a machine that is still preserved in a London museum. He had spent nearly 30 years upon it, with $30,000 of his money and nearly $100,000, of government funds. This was Mr. Babbage, whose calculating engine was designed for scientific purposes. When Yankee machine tools and standards were applied to the same idea and the calculating engine adapted to business uses it became the adding machine (made in great quantities today), which was practically the first mechanical aid to the accounting department. The use of mechanical devices in the accounting department has made wonderful strides in the last decade.

Billing Machines.

The machines we use for billing are the regular No. 11 Remington typewriter with the Wahl adding and subtracting attachment, also equipped with a special tally-roll attachment. This device is located at the right end of the typewriter carriage and carries a roll of paper which runs through the machine continuously. Bills show dates, present and previous meter readings, number of kilowatt-hours used during the month, amount, sales and balances. The amounts are added in the first totalizer and total shown on the stub, thus carrying this total to the second totalizer.

In order to secure a complete check on the billing, three seven-wheel totalizers are used: The first for the total of the bills, the second for the stubs, and the third for the earnings of the month. If no errors are made in the billing, the bill and stub totalizers will check.

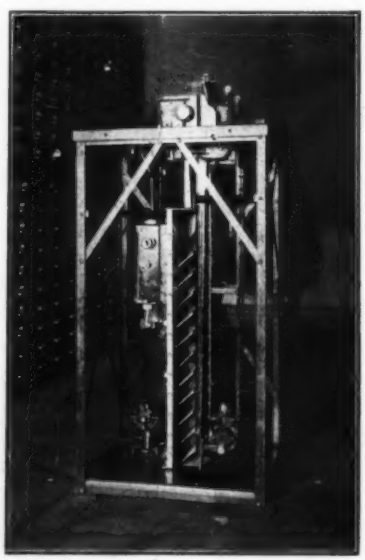
The third totalizer, which is used for the earnings, adds on the tally roll attached to the right end of the machine. At the end of each route the tally roll is detached, there being no clerk for this totalizer on the machine, it is checked by the tabulating clerk and will be referred to later.

Our billing work is done on two of these machines. The operator averages about 180 bills per machine per hour; test run on residential bills, 240 per hour; 120 to 150 commercial bills per hour. They have not made speed tests on commercial bills. There is some time saved in this method of billing and the bills rendered are much neater.

The Addressograph.

In estimating, we figure the salary of the operator at about $2 per day, which is the average wage for this kind of work.

Addresses written by hand can be done at the rate of about 125 names per hour at a cost of about $2.00 per thousand.



Hollerith Sorting Machine.

The same work can be done on the typewriter at the rate of about 200 impressions per hour, at a cost of about $1.25 per thousand, or a saving of 60 per cent over handwork.

Several years ago the Washington Water Power Company installed a rubber-type machine, with which an experienced operator would run off about 1,200 impressions per hour. This brought the cost of addressing down to about 21 cents per 1,000 impressions, a saving of about 495 per cent over the typewriter method.

But with this machine, it was necessary to insert new type every 12 months on account of the rubber type becoming so worn that it would either fall out of the casing or become illegible, making it necessary to duplicate the initial cost each year.

The Addressograph installed four years ago made it possible for the operator to make addresses at the rate of about 3,000 impressions per hour (24,000 per day), obtaining a result of about 8 cents per 1,000 impressions, or a saving of 162 per cent over the rubber-type machine.

The Addressograph is driven either by direct or alternating-current motor. It is used in printing addresses on bills, envelopes, index cards, making up stockholders' lists, and advices; and lists of employees, and also serves as a complete card-index system. These machines cost $190, and 75 cents additional for each filing case, holding address frames.

The "Graphotype" is a motor-driven machine, used for embossing typewriter style type on metal address plates, used in the Addressograph. Names and addresses can be formed on the metal plate at the rate of 90 addresses per hour. The machine costs $380. Metal plates for four line addresses, $4 per thousand. An index frame holding metal plates, $20 per thousand. The machine is used in making up initial lists and all subsequent changes and additions in names and addresses.

There are now more than 40,000 Addressographs in use by concerns in 244 distinct lines of business. The most recent device along this line is the

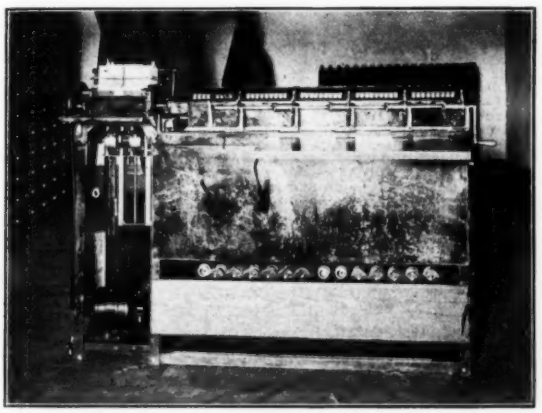
1 From a paper presented before the convention of the Northwest Electric Light and Power Association, Seattle, Wash., September 3-5.

automatic Addressograph No. 3. It is larger and a much more complete machine. The same Graphotype plates and frames used on the other machines can be used on this.

The matter to be addressed is stacked on a shelf at the right, and is automatically fed into the machine, one piece at a time. It operates continuously at a speed of 125 impressions per minute, and can be adjusted to print in duplicate and triplicate, as well as consecutively.

Should a piece of matter to be addressed fail to reach the printing point, or should the operator forget to keep the magazine supplied with address plates, the machine will stop automatically. The address plates can be put in and taken out of the machine without bringing it to a stop. It can be used for all classes of work that the other machine can, except listing. The price, delivered and installed, is $700.

Ledger Rack Device in Accounting Department.



Tabulating Machine Used by Washington Company.

"The Hollerith" Tabulating and Sorting Machines.

These machines are made by the Tabulating Machine Company, 1054 Thirty-first Street, Washington, D. C.

At the National Electric Light Association at Seattle, held in 1912, a paper entitled "Progress Made in the Uses of the Tabulating Machine," by William Schmidt, Jr., was read. It was a very interesting and instructive paper, and anyone interested in the tabulating machine should read this paper.

January, 1911, we installed the tabulating and sorting machines. We use a small card of 29 columns. The machine had three counters, "maximum demand," "kilowatt-hours" and "amount."

January, 1912, we installed larger machines and a more complete system. The tabulating machine has five counters, the card 44 columns, divided as follows: Month, Route, Page, K. W. H., K. W. D., Load-factor discount, Bill less load-factor discount, Quantity discount, Net bill, System, Business schedule, Rate class, and Number of days.

"System" denotes the service supplied by the company, as.

System 1, Edison Direct Current.

System 2, Alternating Arc and Incandescent Lighting and Motors on Lighting meter (City).

System 3, Alternating Power (City), etc.

We have six different systems in the city and eleven others for transmission lines. All accounts are classified according to business, as Business 22, Residence; Business 53, Elevator; etc.

In handling our accounts all extensions are made on ledgers, that is, entries from meter reading books, orders received from the contract department, such as opening of new accounts and transferring or discontinuation of same. The bills are made direct from the ledger by girl typists on the Remington billing machines as already explained.

The tabulating cards are perforated by a girl operator on a key-punching machine from the ledger at the rate of about 300 cards per hour.

The perforated cards, and the bills with the total of each route made by the billing clerk, are sent to the tabulating department, where the cards and bills are balanced. The cards are sorted into Rate Class and Schedule.

Rate Class 1 is the minimum bill for one month's service.

Rate Class 2 is the fixed rate per kilowatt-hour.

Rate Class 3 is the first 20 kilowatt-hours at a fixed rate and the second 20 kilowatt-hours at a lesser rate, etc.

The Schedule is used so the statistical clerk will know what rate the account is given, as:

Schedule 00 Residential rate.

Schedule 27 Combined light and power.

There is an impression that the tabulating machine divides, subtracts and multiplies; this is not the case, it just adds what is perforated on the cards. On our machine we add the number of cards, number of hours, and the amount.

The Comptometer (a machine that I will describe later) is used in figuring out cards and getting out earnings, making up balances, figuring commercial rates where consumer uses enough current to get a load-factor discount and quantity discount, etc.

"Earnings" are made up from the cards. In order to do this we have three different colors, Pink—all flat rate accounts; Green—municipal; and Manila—meter accounts. This aids us very materially in complying with the rules of the Public Service Commission. The cards are balanced with the ledgers at the end of each month.

The tabulator is furnished with what is termed "the Universal plug board," by means of which different forms of cards may be added on the same machine; that is, of course, the cards must be of the same size, but the adding field of these cards need not necessarily agree in position.

The sorting machine will sort anything that is on the cards.

Each month we make a summary of output and income report. The cards are sorted into the classification of accounts. Exhibit "A" gives to the new-business department a line on all of the business enumerated in these several classifications, and by comparison with previous years shows gain or loss in any particular branch of our business.

Exhibit "B" shows how much is received under the present rate per kilowatt month and per kilowatt-hour; this is of value to us in watching the effect of our rates on certain lines of business, as this shows up to better advantage at sight the classification of Consumers' Accounts, and with reference to character of business, also as a whole, than could possibly be col-

lected by examination of consumers' ledgers.

Under Exhibit "A" the classification deals with reference to the supply system. This condition with reference to supply is very important, inasmuch as the direct-current system costs more to deliver than the alternating-current and must be sub-divided to arrive at an equitable rate.

Classification of Consumers' Accounts.

I. WITH REFERENCE TO SUPPLY SYSTEM.

1. Edison direct-current system.
2. Alternating arc and incandescent lighting and motors on lighting meters (City).
3. Alternating power (City).
4. Alternating municipal arc lighting (City).
5. 500-volt power, railway.
6. 500-volt power-station motors, including those on railway feeders or trolley.
7. Coeur d'Alene transmission.
8. Palouse transmission.
   Big-Bend transmission.
10. Spokane Valley transmission.
11. Medical Lake district transmission.
12. Pend d'Oreille transmission.
13. Colfax.
14. Odessa.

II. WITH REFERENCE TO CHARACTER OF BUSINESS.

(a) LIGHTING.

1. Apartments (Commercial Rate).
2. Arcs municipal, City of Spokane.
3. Arcs municipal, Town of Hillyard.
4. Barber shops and bath houses.
5. Books, stationery, art and curios, printing, music and news stands.
6. Banks and trust companies.
7. Building materials and supplies.
8. Churches, colleges, schools, hospitals and public buildings.
9. Clubs and lodge rooms.
10. Drug stores and confectionery.
11. Department stores.
12. Employes—Edison.
13. Employes—railway.
14. Factories.
15. Food supplies—retail.
16. Hotels and lodging houses.
17. Household furnishings and supplies.
18. Incandescent lighting municipal, City of Spokane.
19. Incandescent lighting municipal, Town of Hillyard.
20. Offices.
21. Railroad depots, shops, offices, freight houses, express and transportation.
22. Residences.
23. Restaurants.
24. Saloons, billiard rooms and cigars.
25. Theaters, amusements.
26. Warehouses and wholesalers.
27. Wearing apparel (exclusive of department stores).
28. Miscellaneous accounts not otherwise specified.
29. Signs—flat rate.
30. Outlines—flat rate.
31. Window lighting—flat rate.
32. Offices (advance) flat rate.
33. Miscellaneous (advance) flat rate.

III. WITH REFERENCE TO CHARACTER OF BUSINESS.

(b) POWER:

50. Building material and supplies.
51. Engraving, lithographing, printing, and newspapers.
52. Exhaust and fan motors.
53. Elevators.
54. Factories (miscellaneous).
55. Food supplies.
56. Garages and battery charging.
57. Heating and laundry and tailor irons.
58. Household supplies.
59. Iron works.
60. Lumber manufacturing.
61. Pumping.
62. Refrigerating plants.
63. Sand, gravel and rock crushing.
64. Wholesale town contract.

Recently we made a report for the commercial department of all residential consumers using less than the minimum of $1 per month, the number using less than 20 kilowatt-hours per month, and those using over 40 and less than 60, and those using in excess of 60 kilowatt-hours. This information was a thorough analysis of something over 16,000 accounts.

This report would be impracticable, if not impossible, otherwise than with the tabulating and sorting machines.

These machines cannot be purchased, but are rented from the Tabulating Machine Company. Our rental is $53 for the tabulating machine and $20 for the sorting machine, making a total of $73 per month.

The key-punching and end-gang punching machines used in perforating cards, are sold outright at $75 each. We have two key-punching machines and one end-gang punching machine.

We have to pay the cost of the original composition of the type matter for the cards, and of any changes in the same. Colored cards are five cents per 1,000 extra. These prices for cards are limited to orders for not less than 10,000 cards of any one form.

Besides, being able to get information quickly that would otherwise be impracticable, we make a saving of about $2,800 per year over the old system.

The Comptometer.

This machine is put to many uses in figuring various reports. It is used for addition, subtraction, multiplication and division. It is found very convenient in balancing the kilowatt-hours and amounts on the cards against the tabulator totals of these items. I might add that it is almost indispensable in computing rates.

The Comptometer is undoubtedly a great aid to the accounting field. From the first inception of the direct-acting key-driven type of machine to the present time, Mr. Felt in designing, developing and perfecting the device has had in mind the production of a machine that would register the results the instant the key travel was completed, a machine that would operate at the highest possible speed and yet be absolutely dependable in results, durable in construction and guarded against mechanical error. His latest machine, the controlled-key, Model E, after more than a quarter century of evolutionary progress, is so constructed that it will make misoperation a difficult task, guard against error from partial addings; the machine will refuse to add if the key is not given its full depression, and will compel the operator to go back and complete the kep depression before it will allow the operation of the keys in any other column.

It is a non-listing machine. The controlled-key makes possible and practical the adding with conscious accuracy, because in adding a number of items every key must have its correct value or the operator could not proceed to the end of the items. The direct results afforded make it an exceedingly rapid machine.

One of the features that has made it of extraordinary value is the fact that it will perform all of the four mathematical calculations in any interlinking sequence. It will first add a number of items, then reduce it to another denomination by dividing; will multiply this quantity by a price and then continue and make a deduction.

"Ledger Rack Device."

This device was made by ourselves for convenience in holding the ledgers for the billing clerks and the operators in perforating the cards for the tabulating machine.

The following is a list of mechanical devices in use by our Company.

Addressograph and Graphotype.
Adding Machines (Burroughs).
Remington Billing Machine.
Cashier's Money Changers.
Cummings' Perforating Machines.
Comptometer Calculating Machine.
Brunsviga Calculating Machine.
Underwood and Remington Typewriters.
Hotchkiss Paper Fasteners.
Jupiter Pencil Pointers.
Numbering Machines.
Punching Machines.
Mimeograph.
Hollerith Sorting Machine.
Hollerith Key-Punching Machine.
Hollerith Tabulating Machine.
Hollerith End-Gang Punching Machine.
Protectograph.
Postage Stamp Machine.
Dictaphones.
Ledger-Rack Devices.
Rectigraph.
Time Recorder.
Cash Registers.
Index-Card Cutter.
Rubber Stamps.

Seasoning Timber Electrically.

In describing his latest researches in the electrical seasoning of timber, Dr. Nodon claims that his process can be applied in the forest where the trees are felled, since no cumbrous or costly equipment is required. The process depends on the electrolysis of cellulose and its derivatives. The newly-felled trees are sawn into thick planks and laid on a false flooring, one on top of the other, with the interposition, however, of moistened matting or similar material between each layer, to act as electrodes for the introduction of alternating current which is passed for 10 hours or so. The effect of the current is to produce chemical changes in the cellulose and the sap, rendering them impervious to decay. Further, the sap loses those gummy and hygroscopic characteristics which normally prevent rapid drying. It is claimed that timber thus treated is ready for use a few weeks after it is felled, and is harder, stronger, more homogeneous, easier to work and less warped by moisture than timber which has been seasoned by the ordinary air-drying process. Paving blocks treated by the Nodon process are said to have been in use at Bordeaux for six years without sh w ing appreciable deterioration.—*Electrical Review* (London).

MANAGEMENT AND OPERATION OF AN ELECTRIC LIGHT PLANT IN A SMALL TOWN.[1]

By E. G. Robinson.

The Jim Creek Water, Light & Power Company was organized in the fall of 1905, to take over a small steam plant in the town of Arlington, Wash. The company took over the plant December 1, 1905, with the writer as engineer and manager. There had been started a dam on Jim Creek, five miles from the town, and at this time it was about one-third completed. The writer found the old company had no method of keeping the operating or plant accounts, and a very crude and inaccurate method of keeping the customers' accounts. The company had the water, and the light, and as no books had been kept, there was no definite method of knowing the relative cost of each.

The plant, water and light, was bought by the present company for a lump sum. In the beginning, it was necessary to start a set of books, both plant and customers. We employed a young man in the town, who gave the company bookkeeping about an hour a day and made no pretense of any other office work. The writer did all other book work of starting a customers' ledger, getting our forms for jobbing work, and in fact, every detail had to be worked out.

The first dam that was built on Jim Creek was washed away with but a little more than one-half the finally intended head, March, 1906. This was quite a disaster, and delayed development. But after due consideration, a contract was let for a concrete dam; this was completed in November, 1906, and a few days after filling, the water washed around the intake and wrecked the entire plant, but did no damage to the dam proper. This was a terrible catastrophe and a costly disaster.

All this time the company had been buying steam from a shingle mill, and as this was very unsatisfactory we decided to install a boiler. This we did, completing it in December, 1906, and using oil for fuel. This oil cost $1.50 per barrel, laid down, but was better and slightly cheaper than wood. We were now able to go after new business, as our service was good, and our steam capacity ample.

At this time we had one night engineer, and a lineman, who was also a general all-round handy man, who was hired to do anything he was told to do. Our steam pumps for city water were in the same building with the electric plant, and were operated from about midnight until morning. In the spring of 1907 the writer undertook to reconstruct the wrecked hydraulic plant, and went to the dam site and camped there, so as to see personally to all the work of reconstruction. At this time we had trained an old man in the town, so that he could keep the books, both customers' and the company's, and have the office open eight hours a day. I was only able to come down once a week to see to the town business.

This work was completed to a sufficient degree so that we started the lights from the water power plant on November 3, 1907. And since then we have had the lights out only five nights, and that was all due to trees across the line. The capacity of this water power plant is 200 kilowatts. This is large for a town of 2,100. On account of this excess capacity, we have been able to continue a flat-rate system to a very large extent.

Our operation and maintenance including experting books and legal expense, was 36.8 per cent of our gross income for light, water and power in 1912. I believe this is low for a plant of this size, taking into consideration the class of our maintenance.

We do business on the theory that all customers deserve the same treatment. Our rules are strictly enforced on the great as well as the small. Some who have expected favors because of their affluence have been badly bumped. I don't believe any one thing in a small town will be more effective in making enemies than favoritism. You might get away with it in a city, but in a small town where the chief employment of a goodly number is attending to their neighbor's affairs, it won't do. We give the same treatment to the large and the small. In a small business, we can't afford to despise the small customer, for we go on the principle that "every little bit added to what you've got makes a little bit more."

In the town there are only three stores that are not using electric light. We have 80 per cent of the residences using light. We allow the free use of electric irons to our flat-rate customers, not wishing to put a premium on dishonesty, and have them buy their irons out of town. We keep all service hot on Tuesday forenoon for ironing. We will reap the harvest when we install meters throughout the town.

About 95 per cent of our residences are on the flat rate, as our plant capacity is in excess of our demand. This has naturally led to the lavish use of electric light. We are slowly working in more meters all the time, and this summer have placed all rooming houses and hotels on meters. We will finally meter all services as we find conditions warrant. To illustrate the extravagant use of light. The old Company required that the customer buy the meter. One man who had bought a meter, after having his bill run $5.55 for the month of December, decided he would take a flat rate of $3.00, which was what his service figured. After 26 months, I read this meter, and the average consumption was 84 kilowatt-hours per month.

But this is not the greatest evil of the flat rate. The worst thing to contend with is the increase of the size of the bulbs. I am satisfied I could cut down my residence peak load 50 per cent by metering. Our residence lighting customers are, 196 flat rate, 7 metered. Our business flat-rate customers are 74. Business metered customers are 35.

My experience is that the business flat rate is more satisfactory than the residence. It is easier to keep a check on them, and the revenue is better on the short-hour customers than if they were metered. But it will not be a great while before we will be forced to meters. For a long time we did no advertising at all, but depended entirely on personal soliciting for light, the writer doing most of this. But in the past two years we have spent $145.90 for advertising. Some of these have been display ads, using cuts furnished by several supply houses.

We have also used the moving picture shows for special announcements and find them effective. I believed in and have gotten results from special advertising. I do not believe a card announcing the business and giving address and office hours is of any value whatever.

We believe that of all institutions in the town, the light and water company should be the leader in boosting and advertising the town. As the town grows there will be more bakeries, more hardware stores, more groceries, etc., but not so with the light and water business, so we believe that we get the lion's share of the growth and prosperity of the community.

A year and a half ago, the writer launched a white way lighting system. It cost to install this system complete $325. There are 550 lamps in it and has caused more favorable comment than any one anticipated. Our revenue from this is about $65 per month and has cost to maintain about $5.50 per month. These lamps burn until midnight.

A little over a year ago, we started a power load, first with a 7.5-horse-

1 From a paper presented before the convention of the Northwest Electric Light and Power Association, Seattle, Wash., September 3-5.

power motor in a foundry. A small start, but as we operated a 600-horsepower motor for 7 hours a day for our domestic water service, this power load only meant a few hours a day more to operate the plant continuously. Our list of motors is now: 3 one-horsepower; four two-horsepower; two three-horsepower; four five-horsepower; one 7.5-horsepower; and several forge blowers, commercial irons, etc.

We also have coffee grinders and a number of electric fans. We sell the motors at the standard Seattle retail price and add the freight and cartage. I have devised a scheme of connecting a power customer's 220 volt meter so that I can furnish him light at 110 volts on the same meter and also get approximately the lighting rate. Our motor service is three-phase 220-volt; we bring in a neutral from the power transformer, and run this direct to the lighting circuit, the other side is tapped to one of the 220 volt wires that go through the power meter and that corresponds to the transformer that the neutral is brought from. Therefore, there is 110 volts pressure on the lamps, but the meter is registering this current at 220 volts. It therefore registers twice as many kilowatt-hours as are actually used, but as our power rate is approximately one-half the lighting rate, this practically gives us the result mentioned above. This does away with the second meter and the operation and maintenance thereof.

When the 500-watt tungsten was put on the market I believed that from the service the 250-watt lamps had given that I could change my street multiple arcs to 500-watt tungstens and give the city a more reliable and satisfactory light. This would be better for us and would be cheaper and less trouble. I put one up on trial and after a month the council gave me the authority to change the seven arcs over to 500-watt tungsten.

The life I have gotten from the units has varied from 1,800 hours to 6,000 or more; for the past 2.5 years I have kept an accurate record of each lamp and the average is in excess of 3,500 hours life. Everything that cuts down the daily routine in a small plant is of considerable help. In winter the arcs had to be trimmed every four days and in summer once a week. We have seven of these 500-watt street lights, two 250-watt tungsten and 60 80-watt Gem lamps.

In our meter testing, I have devised a scheme that is infinitely better than a bank of lamps for a load. I have used Nichome, made by the Driver-Harris Wire Company, of Harrison, N. J., for a resistance and by an arrangement of single-pole knife switches am able to parallel or series any number of coils. As the current is nearly directly proportional to the voltage and as it stands a high temperature, you can readily use 110 or 220 on the same wire. This is also considerably cheaper than a bank of lamps with the fittings.

Any complaint of service, light or water I handle. If necessary I put a recording volt meter in the store or house if the complaint is on account of voltage. But I have found that to take the portable volt meter and show the customer how to read it and let him take readings every half hour and make a record of them has a good effect. He is getting the record himself and he rather likes the confidence you have placed in him to get these readings, and after getting a minimum of 110-112 volts and showing him a new lamp, it is easy to convince him to use Mazda lamps or throw his old lamps away and get new ones. Most of such complaints can be traced to depreciated lamps. We often replace a tungsten lamp that has not given the proper service and by a little observation you can tell when it has been misused.

New Sign of the New York Edison Company.

New Sign for New York Edison.

A large flashing roof sign 50 feet square has just been erected by the O. J. Gude Company for the New York Edison Company on the roof of the Columbia Theatre Building at the northeast corner of Forty-seventh Street and Seventh Avenue. The sign is placed diagonally across the top of the building, and from its commanding position can be seen in all parts of Longacre and Times Squares. Thirty-eight hundred ten-watt tungsten lamps are used and will be burned from approximately one-half hour after sunset to one-half hour after midnight each night. The sign combines the company name, and its trademark, the "Edison man."

The effect is indeed a brilliant one, and the sign as a whole is one of the most conspicuous and pleasing of the many marvelous exhibitions of the kind in this vicinity. The accompanying illustration gives some little idea of its appearance, but on account of the prominence of the Columbia Building the effect is somewhat lost.

Indirect Lighting by Arc Lamps.

In a paper on "Indirect Lighting by Arc Lamps," read before the Victorian Institute of Electrical Engineers, Justus Eck made a strong claim for the arc lamp for the illumination of the interior of retail shops and other premises in which indirect lighting is feasible. To establish his case for indirect lighting, Mr. Eck quoted a series of experiments on the reading of complicated words and figures in small type in different illuminations. The seven individuals taking part in the tests were of different ages and occupations. In the result, to enable all seven individuals to read the test-sheet, 1.5 foot-candles of indirect light was required, and 7.3 foot-candles of direct light.

As a direct comparison between arc and incandescent lighting Mr. Eck quoted a case of metal-filament lamps in prismatic glass shades in which a consumption at the lamp terminals of 1.2 watts per square foot of floor surface gave an illumination of 4 foot-candles. He compared with this two cases of indirect arc lighting. In one, an illumination of 1.74 foot-candles on the floor was produced by 1.1 watts per square foot at the lamps, the corresponding figures in the other case being 4.57 foot-candles and 0.9 watt. The items of renewals, etc., were said to show an advantage of 25 per cent for the arc lamps.

Electric Fans Popular in Ceylon.

A special American consular officer now traveling in India and Ceylon remarks in a recent report that, while on the occasion of a former visit to Ceylon about five years ago he had observed native servants generally employed in private residences to work the old-style punkahs by hand power, at the present time electric fans have almost entirely superseded them.

The Oregon Power Company has closed a contract to furnish electric power for the lines of the Portland, Eugene & Eastern Railway between Eugene and Salem, Ore. This power will be supplied from the Springfield plant over a 33,000-volt line to Albany.

Electrical Construction

SOME INTERESTING CONSTRUCTION FOR STREET ILLUMINATION.

Description of a System Recently Installed in Maryville, Mo.

When the carbon-filament lamp, with its relatively low efficiency and consequent high cost of operation, was the principal unit employed in electric incandescent lighting, brilliantly lighted interiors were rather expectional in the average town. Considerations of cost of energy consumed tended to induce the consumer to use no more light than the more urgent and most apparent needs of his business demanded. Where the prevailing standard of interior lighting is low a low standard of outside illumination is very liable likewise to prevail, for the ideas of the public as to what constitutes good outside lighting depend in a large measure upon what the individual is accustomed to in the way of inside lighting. It is not unnatural, then, that in the days when the carbon-filament lamp was the main incandescent unit, inadequate street illumination should have been more or less common.

But the tungsten lamp has done more than create a demand for outside lighting by bringing about a more liberal and generous use of light within doors; it has made possible the economical lighting of streets with incandescent lamps, with the uniform distribution of the light and the many other desirable qualities of illumination which may thus be procured.

Outside lighting with incandescent lamps seems to have originated in efforts to produce ornamental or spectacular effects. The earlier installations were usually of a temporary kind —work installed to lend distinctive appearance to some special event or other. Now that the permanent installation of incandescent lamps for outdoor service has become common, the idea of producing ornamental effects has been retained. No little thought has been given to the development of lamp standards and fixtures of modestly ornamental designs, and there are now on the market lines of this material that leave little to be desired in matters of good appearance and general fitness for the purpose for which they were intended. The fact is, the problem of obtaining the best appearance and of insuring the highest economy of operation in an installation of the kind in question has about reduced itself to one of correct wiring for the lamps. The following notes show in detail how that matter was handled in a street-lighting system installed not long ago in Maryville, a Missouri town of some 6,500 inhabitants.

Fig. 1.—Night View of Typical Street Before New System Was Installed.

Fig. 2.—Night View After Installation of New System.

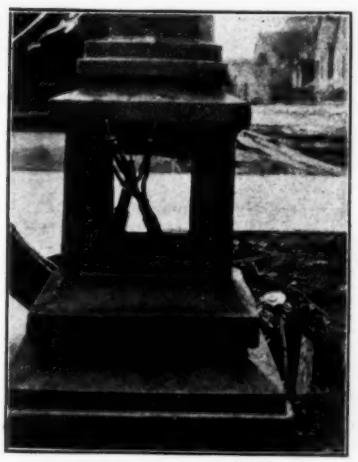


Fig. 3.—Ends of Cables Brought Into Base of Pole.

This town was lighted originally as shown in Fig. 1, which figure is a night view of one of the principal streets. Fig. 2, it should be noted, is a night view of one of these streets after the new system was put in.

The new system consists of 74 five-lamp standards, or ornamental posts. Four of the lamps on a post are 40-watt units, while the top lamp is of the 100-watt rating. Tungsten lamps in standard diffusing globes are used. The posts, which are of iron, of course, were built by the King Foundry Com-

pany, of St. Joseph, Mo. They are spaced eight to the block, four on either side of the street, which means that they are between 90 and 97 feet apart everywhere. Since any attempt to stagger the posts would have made it inconvenient to place a post on every street corner, the plan of placing them exactly opposite each other on opposite sides of the street was adopted. That the arrangement adopted gives a remarkably uniform illumination over the entire street and sidewalk surface is a fact very well brought out in Fig. 2.

The lamps are of the multiple, or constant-voltage, type; and the four bottom lamps on any post are connected in parallel with each other and with the bottom lamps on other posts. The top, or 100-watt lamps, are connected on other multiple circuits. These latter lamps burn all night every night, but the four bottom lamps on all the posts are turned out at eleven o'clock each night.

In Maryville the electrical distribution system is an alternating-current

TABLE I.—CAPACITIES OF CIRCUITS BETWEEN DIFFERENT LAMP POSTS.

Between Posts Designated	Circuit Consists of (Number & Size, B & S Gauge of Conductors in Run).
2 and 19....	One No. 0, one No. 1, one No. 4
2 " 67....	" " 6, two " 8
17 " 57....	" " 4, two " 6
19 " 29....	" " 4, two " 6
32 " 35....	" " 6, two " 8
32 " 39....	" " 6, two " 8
27 " 44....	" " 6, two " 8
57 " 63....	" " 4, two " 6
63 " 56....	" " 8, two " 10
62 " 52....	" " 8, two " 10
19 " 22....	" " 8, two " 10
26 " 23....	" " 8, two " 10
67 " 70....	" " 8, two " 10
67 " 71....	" " 8, two " 10
2 " 14....	" " 8, two " 10
11 " 8....	" " 8, two " 10
64 " 48....	" " 8, two " 10
2 " 1....	" " 8, two " 10
36 " 41....	" " 8, two " 10
49 " 54....	" " 8, two " 10
45 " 42....	" " 8, two " 10
48 " 46....	" " 8, two " 10
71 " 74....	" " 8, two " 10

system. The all-night lamps referred to above are connected on one of the two transformers employed to take care of the down-town street lighting, while the rest of the lamps are connected on the other transformer. A sort of three-wire circuit, or rather two circuits using one wire in common, is the scheme of wiring employed. It is shown diagrammatically in Fig. 9. The control switches are in the primary circuits of the transformers. It will be noted that by opening the primary circuit of transformer No. 1 the four bottom lamps may be extinguished, while the top lamp is similarly controlled by means of the switch on the primary side of transformer No. 2. These switches are located in the central-station that supplies the lighting current.

It is hardly necessary to point out that in addition to the gain in economy effected by the foregoing arrangement, it insures extra security against any portion of any street ever being left in temporary darkness. In case something should happen to put one of the circuits out of commission for a time, the other can be used to furnish at least light enough for minimum requirements while repairs are being made.

In the installation under consideration all the circuits are run underground. The Safety Steel Taped Cable, manufactured by the Safety Insulated Wire & Cable Company, whose factory is at Bayonne, N. J., was used throughout the job. This is a cable designed to be laid in the ground directly, without the use of any conduit or other raceway. In the Maryville job the cable was laid under the brick paving along the edge of the street. Two of the accompanying figures show rather well how the work of cable laying was done. When paving bricks enough had been removed to make a channel sufficiently wide, a narrow channel for the cable was cut in the concrete foundation on which the bricks had been laid, and after the cable was in place the channel was slushed with cement and the bricks replaced. Three-wire cable was employed. The foundation was not broken through except where the cable was

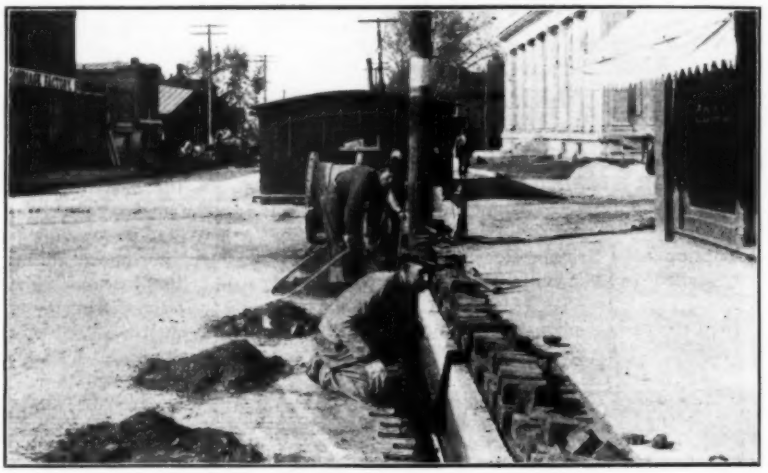


Fig. 4.—Workmen Laying Cable.

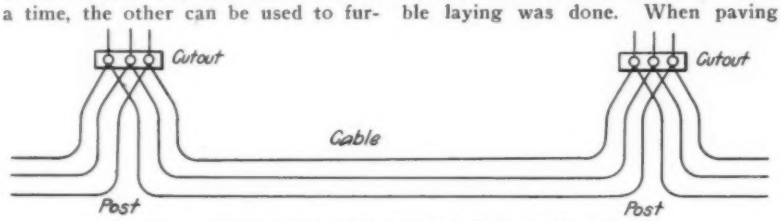


Fig. 5.—Method of Wiring from One Post to the Next.

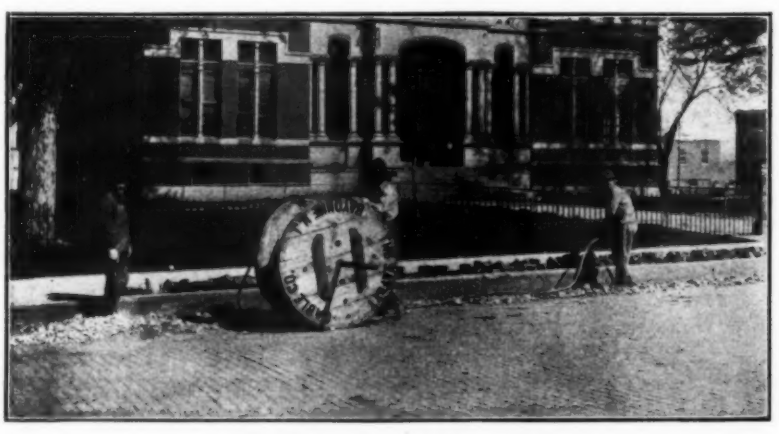


Fig. 6.—Another View of Cable Laying.

carried under the curb and into the tile in the bottom of the lamp post.

Fig. 8 is a rough map of the district lighted, and the lighter lines on

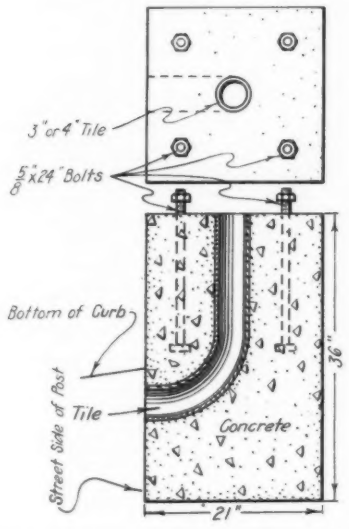


Fig. 7.—Construction of Foundation of Pole.

this indicate the approximate arrangement of the feeder cables. Table I shows the sizes of the various feeders and sub-feeders. It will be noted, for example, that between post No. 2 and post No. 19 there is a cable containing one No. 0, one No. 1 and one No. 4 wire; while between post No. 2 and post No. 67 a cable having a No. 6 and two No. 8 wires runs. As Fig. 8 shows, the feeder from the transformers to post No. 2 consists of a No. 00, a No. 0 and a No. 2 conductor.

In building a foundation a wooden template was fastened on the top of a rectangular hole of the dimensions shown, and four five-eights by twenty-four-inch bolts were placed in the template, so as to hang downward in the rectangular opening. A hollow tile was then put in position in this hole and held there in any way that happened to be convenient while the hole was filled with the concrete which forms the foundation for the post. The tile forms the channel through which the cable is brought into the base of the post, and the four bolts mentioned are employed to fasten the post in place.

A three-pole cutout was installed in the base of each post.

To return for a moment to the method of distribution of current employed, Fig. 5 indicates the plan of wiring from one post to another. The feed from the transformers is carried as already noted, and as indicated in Fig. 8 and Table I, into the bases, of various posts of the system, and from these centers the other posts are looped in in the way shown in Fig. 5. To make the matter clear, consider the wiring to posts *2*, *3*, *4* and *5*. The feeders from the transformers run to a cutout and connection block in the base of pole No. 2. From this block a three-wire cable extends to post No. 3, and the wires connect to a cutout in the base of this pole,, from which cutout block another three-wire cable extends to one in the base of pole No. 4, while connection between No. 4 and No. 5 is similarly made. The thing to be noted especially is that the metal armor of the cable is never broken except in

at Maryville it was found that the cables themselves were sufficient to hold the cutout bases in place while the connections were being made, and so it was possible to make these before the post was set on its foundation.

All connections between cutouts and lamps were made with No. 14 double-braided rubber-covered wires, short pieces of which are shown extending upward above the cutouts in Fig. 5.

Power for the lighting system described above is supplied by the Mary-

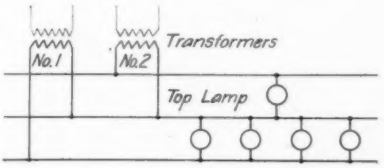


Fig. 9.—Diagram Showing How Lights Are Controlled.

ville Electric Light & Power Company, of which C. C. Hellmers is the manager. The average cost of the system complete, with lamps installed and ready for operation was $65 per pole.

The Maryville Commercial Club raised the money for the installation of the system by means of subscriptions from merchants and property owners. The city pays for the current used. It has a contract with the central station just mentioned to supply power at the rate of $30 per pole per year.

Besides this system of ornamental-post lighting, 170 100-watt tungsten lamps have been installed in the outlying districts of the town. Center suspension is employed here, the lamps

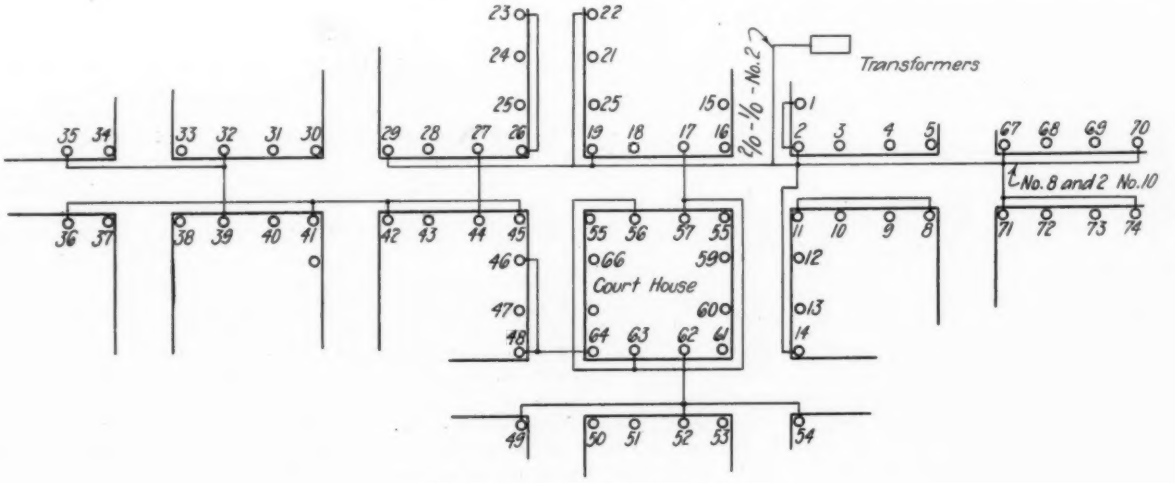


Fig. 8.—Rough Map of Area Lighted.

Fig. 7 is a sectional and top view of the foundation of one of the lamp posts, the upper part of the figure being the top view and the lower a vertical section through the foundation.

the hollow base of a lamp post, and that the wires are bared here and all necessary connections made. Thus there is no need of junction boxes or complicated construction. On the job

being hung one at every intersection of two streets in the denser districts, and one at every other intersection elsewhere. These lamps are equipped with a standard type of radial reflector.

Some Electrical Fallacies.

In all vocations there are certain beliefs more or less firmly rooted in the popular imagination, but actually based upon erroneous ideas, and the electrical industry is no exception; indeed, in earlier days it bristled with fallacies, but many of these have been exploded. Nevertheless, there is still a fair number which persist in spite of the advance of technical education and of repeated disproof.

The writer recently heard it stated that a motor could be built which would run faster if the load on the shaft were increased. A similar statement, many years ago, induced him to try experiments on various motors, changing the excitation, the position of the brushes, and so on, with a view to putting the statement to test, as he doubted the possibility of such an achievement. The results were entirely negative, and consideration shows that this must necessarily be so. In the case of a direct-current motor, the current through the armature (at constant voltage) cannot possibly increase unless the counter electromotive force is first reduced, and this cannot take place unless either the speed is lowered or the field weakened. But the armature cannot carry an increased load unless the current through it is increased, or the field strengthened. With constant voltage, the latter alternative is inadmissible; therefore the speed must fall when the load is increased. A larger current then flows, and this may weaken the field in two ways: by armature reaction, or by a series winding in opposition to the shunt winding, or both. In order to restore the original speed, the field must be weaker, while on the other hand, in order to carry the increased torque, the product of armature current and field strength must be greater than before. Armature reaction alone is not sufficient to bring about the necessary weakening of the field, so that a shunt motor always falls in speed as its load increases. By means of a differential series winding, however, it is possible to weaken the field when the current increases, and thus the speed can be maintained very nearly constant.

The action is similar to that of a mechanical governor on a steam engine, which can be so designed and adjusted that a very small fall in speed results in the admission of an increased quantity of steam at each stroke to carry an increased load; but it is well known to engineers that if the governor is made too sensitive the engine will hunt—the correction applied through the action of the governor may be too great, and the speed of the engine will become irregular. Hence it is necessary to allow a drop in speed of at least 2 or 3 per cent between no load and full load, to insure stable running, and precisely the same thing applies to the direct-current motor. If the compensation for increased load provided by the differential series winding is too great, the speed will become unstable. Hence, it is necessary to allow a small but definite drop in speed with increasing load. With the aid of relays, the problem can be solved, but that is another question.

Again, take the "extra current," so called, which flows at the moment of interrupting an inductive circuit, such as that of a field-magnet coil. There are many who believe that at that moment there is a rush of current, of greater amperage than the current which was flowing before the interruption commenced. The name certainly suggests this idea, which, however, is totally wrong. Of course, the current persists for a short interval, producing a spark; but the act of interrupting the circuit is simply that of increasing the resistance in the circuit more or less abruptly, and the current actually diminishes from the first moment. What really happens is that the fall in the value of the current, which is necessarily accompanied by the collapse of a number of lines of force (using the ordinary convention), and, therefore, by the intersection of the convolutions of the winding by lines of force, results in the production of an electromotive force acting in the same direction as the original electromotive force, and thus tends to maintain the current flowing, or, in other words, which, perhaps, more correctly describes the phenomenon, it opposes the change in the conditions, in accordance with the law of Lenz. If the circuit is very suddenly interrupted, this induced electromotive force may reach an extraordinarily high value, and has often been known to cause the puncture of the insulation of a solenoid; it is, indeed, an "extra voltage" in the sense of an increased voltage, but the current diminishes all the time.

Take now the question of overleaping of current when switching on a tungsten lamp. The resistance of the filament is low at first, the filament being cold. A given voltage, therefore, produces a current far in excess of the normal current, causing the filament to be heated very rapidly. It is easy to fancy that the heating has a sort of inertia, which causes it to overleap the proper limit, so that the filament attains a higher temperature than the normal ultimate value, but this is an erroneous view. The current is always equal to the ratio of the effective voltage in the circuit to the resistance in the circuit at the moment, and as the temperature of the filament (and, therefore, its resistance) rises, so the current necessarily falls, until the point is reached where the current flowing just suffices to maintain the temperature that the filament has attained. A good analogy is a tank fitted with an automatic ball-valve connected with a water supply. If the water is turned on when the tank is empty, it rushes in at first at full bore; then as the tank gradually fills, the ball rises and gradually closes the valve, till when the tank is nearly full the water comes in at a mere trickle. When the tank is quite full the flow of water has been completely stopped. The tank is never filled above that limit. There is only one way in which overfilling could be produced—namely, by the presence of inertia of some kind in some part of the apparatus.

In the case of the tungsten lamp, the electromagnetic inertia known as inductance may supply that condition. Another factor by which the effect of inertia may be produced is that of capacity for heat; the parts of the filament close to the terminal electrodes, and those which are in contact with the supporting hooks, do not heat up so rapidly as the intermediate parts, and thus their resistance does not increase at the same rate. The result is that the resistance is less, and, therefore, the current is greater, at the moment when the temperature of the filament passes through the normal limit, than they will ultimately become, and this would cause a momentary excess of heat and brilliancy. That such overleaping does take place in many cases cannot be denied; but it is not due to the upward rush of the temperature, but to causes such as those above mentioned. No circuit is completely non-inductive, and no tungsten lamp of ordinary dimensions is free from the wire hooks, etc., which might account of the phenomenon.—*Power.*

Underground Wires for Wakefield.

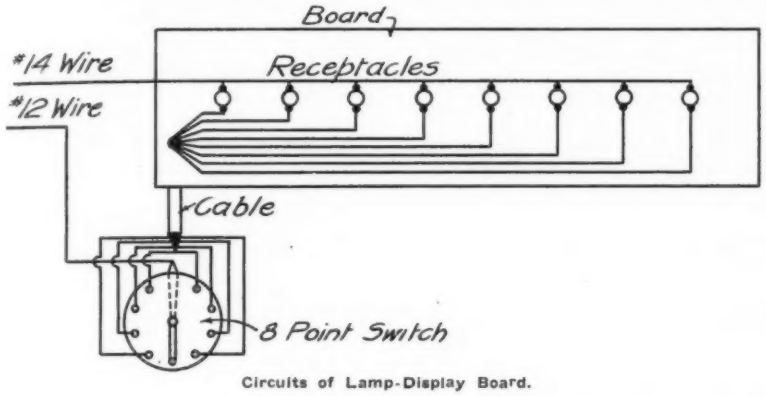
The Bay State Street Railway Company will place its feed wires in conduits in the principal business streets of Wakefield, Mass., while the town will also place its electric light wires and other town wires underground. The estimated cost to the railway company will be $10,000, while the municipal expenditure will be about $4,000. New ornamental iron poles for the trolley line and ornamental iron standards for electric lamps will be installed, replacing about 100 wooden poles.

Colorado Copper.

Copper production in Colorado decreased from 8,024,488 pounds in 1911 to 7,107,303 pounds in 1912.

Board for Display of Lamps.

It happens pretty often that a customer will come into a dealer's store to purchase incandescent lamps without having made up his or her mind as to just what size and sort of lamp is wanted. In cases of this sort the lamp man may have to spend considerable time taking lamps down from the shelves, showing them to the customer and replacing them. To avoid such trouble I rigged up in my shop the lamp board shown herewith.



Circuits of Lamp-Display Board.

On a board nine inches wide and four feet long eight standard receptacles are installed, and one side of each receptacle is connected to a wire which is common to all of them and which is connected to one side of the lighting circuit. Then from the free side of each of these receptacles there runs a wire to one of the points of an eight-point switch, these wires being cabled between the board and the switch. The opposite side of the circuit to that to which all the receptacles are permanently attached, is connected to the rotating lever of the eight-point switch. Thus by shifting this lever any desired receptacle can be put into circuit. The reader doubtless understands that the lever, which is shown in the downward position, can be shifted to any one of the contacts shown along the circumference of the switch.

Samples of the lamps most in demand can be left in these receptacles, and the customer can then be readily shown what these lamps are like.

E. R. Thomas.

Fire Alarm for Cambridge.

Mayor Barry, of Cambridge, Mass., has appointed Ralph Sweetland and George L. Fickett a board of experts to consider a new fire-alarm system for the city. About $20,000 will be expended in installing a new system. Mr. Sweetland is engineer for the New England Insurance exchange and Mr. Fickett is superintendent of the fire-alarm branch of the Boston Fire Department.

Testing Motor-Field Poles.

A simple, accurate way of testing the field of a direct-current motor to see whether adjacent poles are of the same polarity or not is as follows.

Take two ordinary nails of sufficient length to make it convenient to hold one in either hand; and, holding them thus, place the head of one nail against a field pole and the head of the other against the near side of the adjacent pole—this being done, of course, while normal current is on the field. If the polarity is correct—that is, one pole a north pole and the next one a south pole, all the way around, there will be magnetic attraction between the free ends of the two nails, unless the poles are farther apart than is usually the case.

I have found this a very handy test, for it is sometimes impossible to get hold of a compass to check up the polarity.

M. J. Morriarty.

Circuits of An Electric Spring Cutter.

In many sorts of electrical work it is frequently necessary to cut coiled-wire springs specified lengths. The following is a description of an electromagnetic spring cutter arranged so that springs of varying lengths can be cut without stopping the machine.

The electromagnet *a* is mounted on a slate base, all connections to this base being at the back of it; the armature *b* is tipped at the ends *g* and *t* with platinum. At *c* there is a graduated support on which the part *n* of the machine can be slid back and forth, *n* being an insulated contact. The circuit is grounded to the machine at *f*. The electromagnets *e* and *d*, connected in series, have an armature *m* attached rigidly to the cutting tool *o* and guided by the brass wire *w*.

When a spring is to be cut, the metal supports *r* and *n* are set the proper distance apart and the spring pushed through the hollow-tube guide. As soon as the advancing end of it touches the contact *n*, a circuit is completed through the two lamps shown in the diagram, by way of *n*, *r*, *f*, and electromagnet *a*. The resulting attraction of the armature *b* establishes another circuit through *t*, *g* and electromagnets *e* and *d*. Thus the cutting tool is caused to descend. When the piece of spring that has been cut off is removed, the spring *s* lifts the cutter.

A. P. Broadhead.

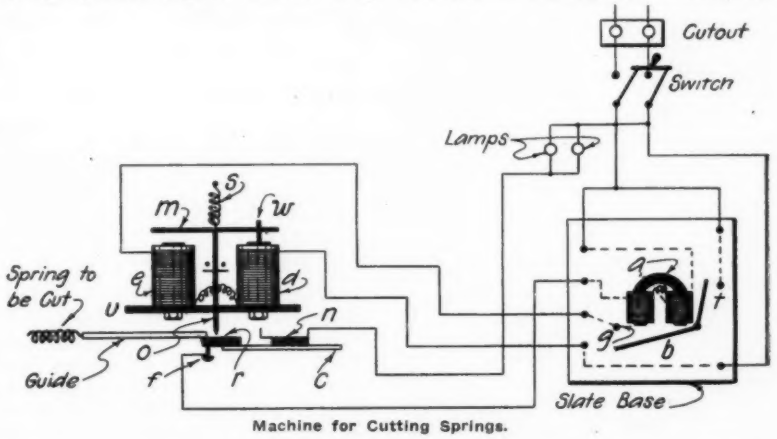
Convenient Way of Testing Out the Circuits.

In doing the final work on a residence-wiring job—such as putting in the switches, base plugs, etc.—it is desirable to test out every outlet carefully before leaving it.

To save time, I do all the finishing and connect up all the bells and batteries before I undertake any testing at all. Then I short-circuit one of the push buttons; having disconnected one side of the battery, I connect the panel-board in series with the battery. Then I proceed to test each outlet with the regular bell system. No trouble is experienced in hearing the bell.

This scheme does away with the necessity of making up a testing set on the job or of adding to your load of materials—which may be heavy—by carrying one with you from the shop.

Ray Frey.



Machine for Cutting Springs.

Fishing Circuits in Finished Houses.

I have found a 15-foot length of small furnace chain, of the flat-link type, to be especially serviceable when conductors are to be pulled into walls in finished houses. There is no trouble about getting it into any partition or wall. For example, if a circuit is to be run in the wall of a first-floor room, the chain can be dropped down from the second floor and pulled through a hole made in line with it in the basement. A good tool for fishing the chain out, and one, by the way, which comes in handy in other jobs, can be made by bending a hook on one end of a short piece of No. 12 iron wire and making a loop for the hand on the other.

I do not generally find it necessary to use either chain or fish tape in wiring to side-wall outlets in old houses. If the wiring is to be done with conductors incased in flexible fiber tubing instead of with armored conductors, an excellent way to proceed is to push the wire into the loom until the end of it is ready to come through, and then shove the loom downward until the opening for the side-wall outlet has been passed; after this the wire can be pushed further through the loom, the loom pulled back until the exposed wire is opposite the outlet and the wire fished out there. Where difficulties would be encountered in getting hold of the conductor at the outlet, the chain referred to in the foregoing can be attached to the conductor before it is started in; it will be convenient in pulling the conductor through the opening.

There are many wiremen that do not go about the job properly when making an opening for an outlet in a plastered partition wall. A bit should not be used in this work. The best plan is to use a screwdriver or an awl to find the opening between two laths, and then, a hole of the proper size for the switch having been cut in the plaster with the point of a screwdriver, a keyhole saw should be employed to saw out the laths. Before the sawing is begun, the wireman should feel in between two laths with his screwdriver to make sure that there are no iron pipes to interfere with the work.

It is not a good plan to saw a lath entirely across at one side of an outlet before it is sawed any at all at the other side, for it may happen that the lath ends at a studding near the side of the outlet where it is sawed last, and that hence when the second sawing is undertaken the lath will give away and break out the plaster. This sort of disturbance can be avoided by sawing the lath about half across on each side of the outlet and then finishing the job by sawing a little on first one side and then the other. O. S. Livergood.

Among the Contractors.

The Dickinson Electric Wiring & Fixture Company, of Dickinson, N. D., has been awarded the contract for the installation of the electrical work in the new Berringer Brothers hotel and store building, in Dickinson. Conduit systems will be installed for both the lighting and power and the telephone circuits. D. A. Cutnaw is the owner and manager of the company.

L. H. Lamont & Company, of Chicago, has the contract to install the circuits for about 600 incandescent lamps in a building owned by the Lucas Paint Company, in Chicago.

John Reichel, who was with the municipal department of electricity in Negaunee, Mich., for nearly twelve years, resigned September 1 to enter the electrical contracting and supply business in Negaunee. He has already secured a number of important contracts for electrical work, and in a short time he expects to open a first-class electrical store. He aims to do a retail business in a complete line of lamps, heating devices, wiring supplies, etc.

L. K. Comstock & Company, of Chicago, has just been awarded a contract to install 3,600 lamps and 5 motors in a new building at 1200 Lake Shore Drive, Chicago, and 900 incandescent lamps and 2 motors in a building at 725 South Fifth Avenue.

B. D. Douty, electrical contractor, of Defiance, O., has the contract for the electrical installation in the buildings of the American Steel Package Company, of Definace. The job consists of highclass conduit construction throughout. Other recent work done has been the wiring of the new building of the Definace Grocery Company, wholesale grocers of Defiance, and the remodeling of wiring in the building of the Harley & Whitaker dry goods store, and the garage of Compo Brothers.

Freeman, Sweet & Company, of Chicago, will install the circuits for 700 incandescent lamps and 20 horsepower in motors in the building of Rothschild & Company at 324 South Wabash Avenue, Chicago.

The Rueff-Griffin Decorating Company, Louisville, Ky., has been awarded the contract for the decorations to be used in that city during the celebration of the Perry Centennial Association in October. Electrical designs will play a leading part in the scheme of decorations.

D. R. Shea, who recently established an electrical contracting and supply business at 604 Clinton Street, Defiance, O., has been awarded the contract for the electrical work in the new post-office building in Defiance.

Edwin C. Lewis, Incorporated, has received the contract for the electrical equipment, including lighting, power and transmission, for the new commonwealth Pier being erected by the Port Directors of the City of Boston, Mass. It is claimed that this firm is probably the only American electrical concern that has been awarded so large a contract for electrical work on any foreign building as that on which they are now engaged—the American College for Girls in Constantinople, Turkey. Other contracts recently awarded are for electrical equipment and power work on the new State Mutual Building and the United States Custom House, Boston.

A new company, the Beck Electrical Construction Kompany has been formed in Minneapolis, Minn., with V. S. Beck at the head. Mr. Beck has held various positions with several of the Stone & Webster Companies in the Middle West, most recently being associated with the Mississippi River Power Company, at Keokuk, Iowa. The new company will do a general engineering and contracting business, making a specialty of electric power plant and transmission line work. It will also act as manufacturers' agents, having already secured the agency for several prominent engineering concerns. Members of this company have had considerable experience in all kinds of development work and the company should be of value to companies and cities, both in investigating the feasibility of and in the construction of electric power plants. The new concern is located at 204 Andrus Building, Minneapolis.

Inspection of Outside Wiring in Chicago.

Until now the inspection of outside electrical construction in Chicago, so far as the city government was concerned, has been done by the street departments, except that there has been inspection of signs by the electrical department of the city. Such practice meant that outside inspection was mainly a matter of seeing that work was mechanically good. During the past week, however, the municipal department of electrical inspection has put into operation the plan provided some time ago of having all outside work, both aerial and underground, inspected by this department. Three inspectors have been provided for this special work and others will be added if necessary. This inspection will cover all exterior lighting and power circuits, telephone lines, etc.

Dollar Wiring Kinks.

Every reader is invited to contribute to this column. It does not matter how few words are used to explain a "Dollar Wiring Kink," provided the idea is made clear; and if a diagram is necessary, a rough pencil drawing will serve. The idea itself must, of course, be new and bright. A dollar will be sent to the contributor upon publication.

Pulling Cleat Line Taut.

When open cleat work is being installed on either a wooden or a plastered surface the following is a good scheme for pulling the wires up taut. The method is satisfactory on any circuit whose conductors are not larger than No. 10 B. & S. gauge.

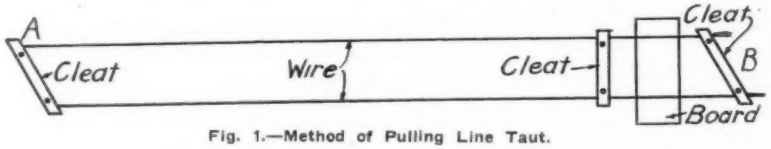


Fig. 1.—Method of Pulling Line Taut.

Dead-end the wires at *A* (Fig. 1) with one, two or three cleats, according to the length of the line. Pull up the wires at *B* as tightly as it is possible to pull them with the hands; set the screws hard and if the strain is great reinforce *B* with one or two more cleats. Then slide a piece of board five or six inches wide under the conductors, and force it on edge. Then one cleat directly in front of the board will bring the wires tight against the ceiling, and the run can be cleated completely between the board and *A*, and so but a foot or two will be left to be pulled up by the plier method.

William E. Rhodes.

Preventing Wires from Kinking.

In looking over the issue of July 26 I note certain suggestions for straightening kinks in wire; I would offer one to prevent kinks.

Most electricians I have employed succeed in getting their wire kinked in unrolling it. This causes no little trouble, and can be prevented by removing eight or ten turns at a time from alternate sides of the coil.

D. G. Shepherd.

Running Concealed Circuits in Finished Houses.

I noticed a kink in the issue of August 30 by Leo Schistzinger on the above subject which seemed to me to be correct in principle but wrong in application.

It is not best to try to bore on a line from the outlet to where the floor has been removed; a preferable plan is to bore straight or nearly straight across the joist, and then run the "snake" from the outlet in the space between two joists to the line of the holes that have been bored. In trying to bore along the line suggested by Mr. Schistzinger one is quite liable to run into bridging or the nails of bridging along the way.

I might also state that in work of the kind under consideration time, patience and materials can be saved by using flexible steel-armored conductors.

A 1.25-inch hole is none too large for two pieces of quarter-inch loom; and sometimes in the better grade of houses double switch control is called for, in which case three wires must be fished if armored cables are not used. A three-wire steel-armored cable will slip through an eleven-sixteenth-inch hole, to say nothing of a 1.25-inch hole.

Finished houses of any type, except those of brick or concrete construction, can be wired without taking up any flooring. The fishing can all be done from behind the baseboards, these being replaced after the wiring is put in and inspected.

R. H. Eddy.

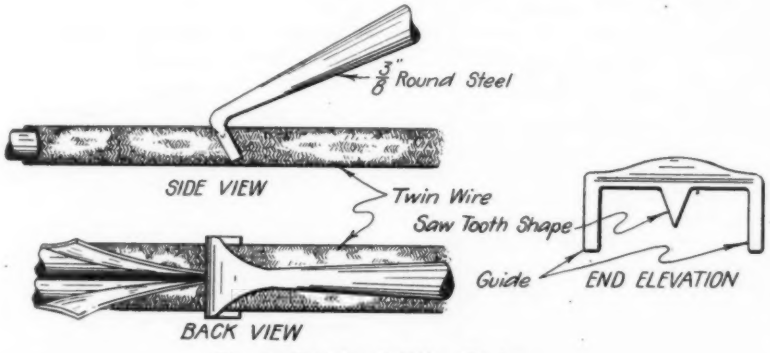


Fig. 2.—Tool for Splitting Duplex.

Wiring Chain Fixtures.

I have noticed some fixtures wired with lamp cord where the twisted pair was used without untwisting. I find that the work is easier and more satisfactory when the cord is separated and each strand run through alternate loops of the fixture chain. In threading cord or wire through the loops of a chain I make use of a hook driven in the shelving of my shop some seven feet from the floor. By hanging one end of the chain over this I have both hands left free to wire the chain quickly.

In regard to the kink relative to cutting flexible tubing which appeared in the issue of August 9, and of which Milton H. McGuire was the author, I should like to say that it is pretty hard to find water in some of the attics; the way I get around this is by wetting the blade of my knife with my tongue and using a sawing motion, around and around the tubing, in cutting.

Sim Naylor.

Tool for Splitting Twin Wires.

Fig. 2 illustrates the construction of a tool that I made for myself, which I have found most serviceable in electrical work. It is a tool for splitting the insulation on duplex wires. As the figure shows, the tool is made of a piece of three-eighths-inch round steel. The cutting end is flattened and bent at right angles to the length of the tool, after which the metal is cut out as shown in the part of the figure marked "End Elevation," the cutting bit being made sharp, of course. The round steel handle can be made any desired length. In the part of the figure marked "Back View," the insulation is purposely shown pulled aside, so as to make clearer the sort of wire under consideration and the method of using the tool.

J. J. Granger.

Another Kind of Lubricant.

In conduit work when the wire is being pulled in, many times wiremen strike a circuit with many short bends, or else find offsets and elbows close to the ends of long circuits, making the fishing in of the "snake" wire a difficult and sometimes a seemingly hopeless task. When I strike a proposition of this sort I take a piece of paraffin and rub it in the front end of the snake for six or eight feet back of the snake point, making that part of the appliance as slippery as possible. Then I proceed to shove the snake in, and I have always been successful in getting it through.

M. J. Moriarty.

Discussion of Chicago Subway Plans.

At the first meeting of the season held by the Western Society of Engineers in Chicago on the evening of September 8, the subject of Chicago subways was thrown open to general discussion. A series of abstracts of eight papers and reports on Chicago subway plans had been prepared by the Publication Committee of the Society and these abstracts were presented in brief form by Past-President O. P. Chamberlain. A number of maps and diagrams accompanying the various reports and papers were also shown.

The discussion was opened by H. E. Bartlett, who presented a general summary of a plan for Chicago passenger subways upon which he had worked for several years. This was accompanied by numerous illustrations showing the routing at various stages of the construction, and also diagrams of stations, track arrangement, etc.

Alderman Eugene Block, chairman of the City Council Committee on Local Transportation, made an address in which he presented his personal views respecting the advisability of subway construction and the type of subways that should be built. He urged that the subway construction be of such character as to decrease the congestion in the central business district as much as possible, and at the same time provide for main high-speed trunk lines connecting the different sections of the city, these rapid-transit express lines being fed by surface traction lines which would provide the local service.

T. F. Deuther, representing an association of business men in the northwestern part of the city, spoke very strongly against taking up any subway construction at all, because he contended that all subway plans presented heretofore had been planned to provide for increased facilities in the central business district only. What he thought was most needed was a great increase in transportation facilities in the outlying districts. All subway construction in the downtown district is bound to eventually stimulate still more traffic into this restricted area and thereby produce still greater congestion.

F. E. Davidson thought that nearly all of the plans as yet considered had taken insufficient account of the future growth of the city. A comprehensive system of subways should be laid out to provide for the almost certain growth of the city to a community of nearly ten million inhabitants. The subway problem should be approached from the city-planning standpoint. Nearly all estimates for subway construction that have been made as yet have been altogether too low and have not taken account of a number of contingencies that doubtless will arise. To him it seemed that the subway problem was more a financial and city-plan problem than one of engineering.

The subject was further discussed by J. W. Mabbs, R. F. Schuchardt, O. P. Chamberlain, and others.

Public Service Commissions

MASSACHUSETTS.

The Massachusetts Board of Gas and Electric Light Commissioners has granted the application of the United Electric Light Company of Springfield for approval of an issue of 2,500 shares of new capital stock, par value $100, at the price of $200 per share. The proceeds are to be applied to the cancellation of notes and the payment of obligations incurred on account of additions to plant.

The Board has given approval of the issue by the Plymouth Electric Light Company of 600 shares of new capital stock of a par value of $100, at $100 per share. The proceeds are to be used to pay outstanding notes and obligations incurred in making additions to plant. The Plymouth Company proposes to extend its lines into the town of Marshfield at an estimated cost of $20,000 or more.

The Board has authorized the Agawam Electric Company to issue 250 shares of new stock at $100 per share. The company applied for approval of an issue of 300 shares. The proceeds of the new issue are to be devoted to the purchase of the plant and property in the town of Agawam used in connection with the lighting business carried on by Oley L. Allen, a contractor, together with the "Feeding Hills Extensions" described in a contract between the Enfield Electric Light & Power Company and Lester E. Flint, and all the plant and property of the Housatonic Power Company situated in the town of Agawam. The Board is satisfied that the value of the property will fairly represent the amount of stock approved.

NEW JERSEY.

The Supreme Court of New Jersey has confirmed the order of the Public Service Commission reducing the rates for gas furnished by the Public Service Gas Company in Paterson and Passaic, N. J. The decision does not recognize any allowance for the value of the franchise, as claimed by the company.

OKLAHOMA.

More complete control of the charges of water, gas and electric companies is proposed by the Oklahoma Corporation Commission under a proposed order, hearing on which has been set for October 14. The order, if made final, will compel all companies to secure the approval of the Commission before making changes in their rates, forms of applications or forms of contracts. Thirty days' notice of any intended or desired change must be given to the Commission. Under the order the companies are required to file with the Commission by December 1 a schedule showing their rates in effect August 1, together with the forms of applications and contracts in use at that time.

VERMONT.

The Public Service Commission of Vermont has reorganized, two new members taking the places of one who was removed from office by Governor Fletcher and another member who resigned. The present board consists of Robert Bacon, of Brattleboro, chairman; Clark Pollard, of Proctorsville; and William Warner, of Vergennes, who is the only member of the old board to be reappointed. The three political parties are represented, the members being Progressive, Democratic and Republican, in the order named above. It is expected that the board will soon make some recommendation on the subject of telephone service and rates, the topic of controversy in Vermont at the present time.

Questions and Answers.

All readers of the Electrical Review and Western Electrician are invited to submit questions and answers to this department. Full names will not be printed except where the writer indicates his willingness therefor. Anonymous communications will not be considered. Questions relating to electrical matters of any kind will be inserted. Answers from our readers should be received in this office preferably within ten days of the date of publication of the question, and will be published in a subsequent issue. Payment will be made for all answers published.

Questions.

No. 161.—Wireless Receiver.—In a radiotelegraphic receiving apparatus, is there any kind of a protective device that will prevent unusual currents, such as are sometimes due to extraneous disturbances, from traversing the receiver?—J. M., Bayonne, N. J.

No. 163.—Parallel Operation.—I would like to see the following question answered by contributors to the Questions and Answers page. We have a three-phase, four-wire, 60-cycle, 220-volt, 200-kilowatt generator driven at 200 revolutions per minute through rope drive by a simple Corliss engine running at 79 revolutions per minute. There is a two-phase, 60-cycle, 6,600-volt transmission line connected to two 150-kilowatt transformers whose secondaries are Scott connected so as to deliver three-phase, 220-volt current to the switchboard. The engine regulates well enough to operate in parallel with a high-speed unit and the transmission line is "rock" steady. Can the generator be operated satisfactorily in parallel with the transmission line?—W. H. M., Hutchinson, Kans.

No. 164.—Life of Dry Cell.—What is the longest life record of a standard dry cell used for intermittent or open-circuit work?—J. S., Hinsdale, Ill.

No. 165.—Synchronous Motor for Line-Voltage Regulation.—A short time ago I heard of the use of synchronous motors on a transmission line to keep the voltage constant at the receiving end. Is this method dependable and is it much used?—N. P. T., Fort Wayne, Ind.

No. 166.—Relation of Tungsten-Lamp Efficiency and Life.—About what is the ratio of life of a tungsten lamp operated at an efficiency of 1.25 watts per candlepower to the life of a similar lamp operated at higher voltage so as to give an efficiency of 1 watt per candlepower?—B. K., Madison, Wis.

Answers.

No. 158.—Negative Booster.—What is meant by a negative booster for an electric street railway? Does it lower the voltage when the load is light?—T. N. W., South Bend, Ind.

A negative booster is a low-voltage high-current generator connected in series with the return circuit or often to a single point in the return circuit. As the negative generator terminal is connected to the track, a negative booster does not change the voltage between trolley and ground. The use of the negative booster is to prevent electrolysis by eliminating leakage from the return circuit; this is done by lowering the potential of the rail at the point of endangered underground structure to such a negative value that the current will not leave the rail. Some railway companies use a system of return feeders and indicator to show the point of greatest leakage. In this case a negative booster is held in reserve and connected to any dangerous feeder.—F. D. K., Syracuse, N. Y.

A negative booster for an electric railway is a booster placed in the negative feed or the return circuit. This is done to overcome excessive drop in the track portion of the circuit which often produces electrolysis of underground pipes. Insulated return feeders are used in series with which is placed a booster. The booster draws the current back to the station and adds its voltage to that of the feeder. If conditions are such that no return feeders are necessary, the booster can be cut in between the track and the negative bus. The above system has not been used in this country to my knowledge, but mostly in England, although I do not believe it has been used even there very extensively.—C. T. P., San Francisco, Cal.

No. 160.—Time-Limit Relay.—Is there any advantage is using a time-limit relay in connection with an oil circuit-breaker in a case where overloads are a frequent occurrence and are of such a nature that it is necessary to open the line? In the case I have in mand, short-circuits are frequent, and unavoidable.—W. E. N. Colorado Springs, Colo.

From your query and location I take it that you are in a mining or similar proposition, where, as a rule, an explosion frequently communicates to adjacent galleries, throwing down trolley lines used to convey the material and causing momentary "shorts." If your line is split into sections and each section fused so that the breaker goes out first, then by using a time-limit relay the "short" will neither blow fuses nor open the breaker, if of very short duration and not too excessive in current flow. If the fault does not clear in time the breaker will operate. If the trouble is such that the line should be disconnected immediately the fuse will blow. The time limit in this case should be independent of the strength of the current flow, between certain wide limits. If it is not possible to divide the system into sections I would not advise a time limit as then the sooner the line is disconnected the better, except that if the system is an alternating-current one or a direct-current fed from a rotary converter, then it would be advisable to use a time limit to allow the short-circuit current rush to decrease to a lower value before opening the circuit, so as to reduce as much as possible the hunting action and danger from transient voltage waves which are excessively high. In mining work, if that is what your case is, it would be advisable to divide the lines into sections and install protected section switches, causing the men to disconnect lines adjacent to an explosion, thus eliminating most of the danger and shorts from falling lines.—E. W., Chicago, Ill.

The only advantage of using time-limit relays is to prevent, to a certain extent, interruption of service from brief overloads or short-circuits. Overloads due to the starting of large motors, or in case of a number of electric railway cars starting at the same time, last for only a few seconds and the power station and line equipment will handle same with ease, but should this overload hold for any length of time there would be danger of burnouts in the generator or transformers. In the case of short-circuits in an underground system, they will frequently burn themselves clear in a short time and the service will not be interrupted except on that particular part of the system depending upon that feeder. Overhead lines will sometimes blow together or a short-circuit will be started by some foreign object being thrown or blown between the lines; the short will only last for perhaps four or five seconds at the longest and if the system had no time-limit-relays every thing would be shut down until the line was reported clear and service resumed, which may mean several minutes or hours.—C. T. P., San Francisco, Cal.

No. 162.—Electroplating Lead and Brass.—Is there any good method for electroplating lead or brass on copper and iron? I should like a formula for the solutions used.—R. H. P., Philadelphia, Pa.

There is a good method of plating a brass finish on copper and iron, but lead plating is a very doubtful operation and is not commercially feasible. Below I have given a method of lead plating and a brass-plating formula. In plating iron or steel objects it is necessary to copper-plate them first to obtain a good, smooth and hard finish, therefore I have given a copper-plating formula suitable for iron and steel.

To copper-plate use a cyanide of copper bath, using a current density of two to three amperes per 100 square inches surface of object to be plated. The voltage for this current density will be from three to five volts. From this bath one ampere-hour will deposit 1.186 grams of copper. The cyanide of copper solution is made as follows: carbonate of copper, 1 pound; potassium carbonate,

0.405 pound; cyanide of potassium, 2 pounds; water, 25 lbs, thus making about 3½ gallons solution. If, on trial, this solution does not deposit freely enough, more cyanide or copper carbonate, or both, should be added.

To plate brass dissolve two parts by weight of cyanide of potassium in one part of carbonate of zinc by weight and add this to the above bath for copper plating until the desired color results. For this solution a current density of 3 to 3.5 amperes per 100 square inches of surface can be used. The voltage will be about the same as for the copper bath.

Neutral solutions of lead acetate and alkaline lead solutions will yield deposits of metallic lead on the cathode when subjected to electrolysis, but because the lead so deposited is very readily oxidized it is hard to put a successful plate on an object. If a neutral or slightly acid (nitric acid) solution of lead nitrate is used the lead is deposited from the solution on the cathode as metallic lead and also tends to form a brown peroxide on the anode causing the anode to become useless in feeding the bath or solution to replace the metallic lead taken from the solution and deposited on the cathode. If it is desired to try an experiment of plating lead a solution given below can be used but very good results cannot be expected. The solution is made from pure lead, one ounce; chemically pure nitric acid (sp. gr. 1.4), 4.6 current density is 0.5 to 1.0 amperes per 100 square inches of surface. The plating will be extremely slow, requiring 12 to 14 hours to deposit as much as 0.2 of a gram for analytical purposes with a current of 0.5 ampere. One ampere-hour will deposit only 0.03 to 0.04 of a gram. If the current density is worked higher, the deposit will be granular or there may be deposited not the metal, but a compound of lead.—E. W., Chicago, Ill.

North Carolina Produces Most Mica.

For many years North Carolina has been the largest producer of mica in the United States, according to the United States Geological Survey. Prior to 1895 the output came chiefly from the larger mines and consisted of big sheets of fine quality. At that time large quantities of small sheet mica that would cut plates less than three inches square were thrown on the dumps as waste. After the small sheet and scrap mica became valuable, the dumps at the large mines were worked over and the quantity of mica produced was thereby greatly increased. Now that most of the dumps have been worked over and only a few large mines are in operation, the output is barely maintained by a large number of small mines.

NORTHWEST ELECTRIC LIGHT AND POWER ASSOCIATION.

Annual Convention at Seattle, Wash., September 3-5.

The sixth annual convention of the Northwest Electric Light and Power Association was held in Seattle, Wash., September 3, 4 and 5, and was the best attended and most interesting and instructive ever held by this Association. Sessions were held on the Roof Garden of the Washington Hotel, which was gaily decorated for the occasion, and everything which would assist in making the visitors comfortable was placed at their disposal.

The program, which included three addresses and twelve papers, was enjoyed by delegates from Washington, Oregon, Idaho, Montana, and British Columbia. The discussions succeeding the reading of the papers were hearty, interesting, varied and highly instructive.

The convention was opened by an address of welcome, delivered by J. E. Chilberg, president of the New Seattle Chamber of Commerce. In a few words, President Chilberg welcomed the visitors, and assured them that they would be well taken care of and royally entertained. He also warmly commended the Association for the strenuous efforts put forth during the last sessions of the Washington and Oregon legislatures, and congratulated it on the results obtained.

President W. J. Grambs, of the Puget Sound Traction, Light & Power Company, in delivering his annual address, said in part:

There has arisen in our great industry a complex problem which is being discussed more and more. This is the question of adequate compensation for our employees. There is a prevailing opinion that some action should be taken or plan devised recognizing the loyal, faithful and efficient employee.

It is but fair that the employee who has devoted the best part of his life to the work of a company, who has been efficient and loyal, should have something to look forward to in return for his faithful services—something more than the daily or monthly wage. The desirability of recognizing the faithful employee has been discussed in various quarters for a number of years. In Europe, for some years, the larger manufacturers, and more recently the large industrial and utility companies in this country, have put into effect various forms of pension and profit-sharing schemes. Among the many changes in our social life that have taken place in recent years is the changed relation between employer and employee, and the feeling that there is a humanitarian side to this relation is more pronounced as time goes on. When the best man has been secured for any position in a company, he should receive adequate pay, be encouraged in his efforts, and in return for his loyal and faithful life service, taught that his welfare will receive consideration at its hands. Freedom from anxiety as to the future of himself and those dependent upon him is bound to create in the employee sympathetic interest in his work which will make for good service on his part.

State regulation of publicly owned and operated utilities is of quite as much importance in the interest of the taxpayer as is the regulation of private-ownership utilities, and the attempts that are being made in many parts of the country to exempt such utilities from state control are against the best interests of the people. Experience has proved that most publicly owned utilities are in need of state regulation, particularly as regards accounting methods and rate-making, and it will be found that if the taxpayers and the people are to be protected, such regulation is essential.

In the State of Washington, the Public Service Commission has been in control of the public service corporations for two years. Our Association has been successful in obtaining fair hearings before the Commission and rendering to the Commission valuable service and assistance in matters pertaining to utility companies. By presenting our case through committees to the Commission, rules and regulating measures were worked out satisfactory to all parties concerned, thereby tending to improve the service rendered by the companies.

In hearings before and in our dealings with state commissions, it would be better if our member companies made a practice of being represented by their executive and operating officials rather than by their attorneys alone. The members of our commissions want a frank, clear statement of facts and must have concise information from those who are best equipped to give them, and not the fine technicalities of law expounded by an attorney touching the operating question under discussion. It is, however, desirable to have an attorney present in an advisory capacity.

Public utilities are a partnership of the public, capital and labor—each has resources that the other needs. Business will fail when any of the three partners fails of the proper reward; business will be unsatisfactory when any of the three neglects to bear its proper share of the burden of direction and support; all must learn to live and work together, each respecting the rights of the other. Capital which has regarded itself as the principal or even sole owner must recognize the quality of the three—must deny itself dividends not earned. Its chief asset is a property with full service value. Good wages and good service are as sacred as dividends. The public must learn that expenses and proper returns to partners can come only out of earnings and depend on rates accordingly. It must learn that public-service business is its business, and that agitation is hampering and expensive to all the partners, including itself.

The report of the Overhead Line Committee was next read by Norwood W. Brockett, secretary-treasurer of the Association. The work of the committee concerning legislation and proposed legislation in the matter of overhead and underground construction was carefully covered. How the question is being handled by various municipalities throughout the Northwest—how the electrical engineers view the matter, and the work of the various

committees in the several states, was fully explained.

At the afternoon session a paper entitled "Management and Operation of an Electric Light Plant in a Small Town" was read by E. G. Robinson, manager, Jim Creek Water, Light & Power Company, Arlington, Wash. The discussion following its delivery was brisk. This paper will be found on page 517.

"Some Operating Problems" by J. B. Fisken, of The Washington Water Power Company, Spokane, Wash., was then presented.

Some Operating Problems.

This paper does not take up the problems of power-house operation but the broader problems which confront operating officials such as (1) the relation of the operating department to other departments; (2) its organization; (3) safety and the measures to be taken to secure the protection of employees, public and property; (4) welfare work. The company considered is of fairly large size, furnishing not only light and power but street-railway and interurban service. An outline is given of the organization of such a department with the duties of the various assistants. The desirability of a safety committee to develop means of preventing accidents is pointed out and the organization of such a committee given in detail. All employees should be trained in resuscitation and first-aid assistance. Welfare work is advocated and should include an organization of employees for social purposes, sickness and accident benefits, old-age pensions and an employees' investment fund. An assembly hall should be provided, where classes, lectures, dances, etc., can be held, with facilities for games and reading.

"The Tireless Farmer Results from Ruralizing Electricity," by J. E. Davidson, of the Pacific Power & Light Company, Portland, Ore., was the last paper to be delivered at this session.

The Tireless Farmer.

This paper deals with the more important uses of electricity in rural districts. In only a few cases will the extension of lines into rural communities be profitable at the outset. If made on a small scale in a business-like way some returns should be realized at the end of the third year. If done on a large scale, returns should not be expected within less than five years. The farmer needs to be educated in the practical use of electricity and the power company must undertake this. Study must be given to local rainfall records, climatic conditions, soils, selection of crops and preparation of products for market. The loads most easy to obtain are lighting, pumping and general-utility motors. Illustrations are given of successful installations, including not only the above but milking machines, milk separators, various forms of cutting machines, electric incubators, fruit-wiping machines, electric cooking ranges, washing machines, refrigerating plants, household appliances, etc. As to rates, the author advocated for power a demand charge plus a low energy charge; for lighting, an energy charge which should only be slightly larger than in nearby towns, with a slight increase in the monthly minimum; for heating, a monthly charge for each range plus an energy charge. Contracts should be carefully prepared and cover all kinds of service to be rendered, avoiding as far as possible technical terms. The success of rural business will depend largely upon the solicitor. The cost of installing distribution lines, transformers and meters should not exceed two or three times the gross annual income from the business. Lines should be constructed at the lowest possible cost, but well enough to avoid large maintenance charges. Established transmission lines help to keep down investment for new construction, and territory along these should be first canvassed. Reliability and continuity of service are important in dealing with the farmer. Among the advantages of a rural load are (1) increased earning per capita; (2) improvement in load-factor and diversity-factor; (3) higher efficiency in operation; (4) greater revenue per kilowatt of station capacity; (5) a higher net earning.

The first paper to be heard at the session on Thursday morning was "The Regulation of Public Service Utilities," by George A. Lee, ex-chairman of the Public Service Commission of Washington.

The experience of the writer as chairman of the Public Service Commission qualified him to speak with authority on this great problem. He chose to speak generally on the broad subject of regulation rather than on any one phase of it. After calling attention to the fact that state regulation has become in the past few years a well defined governmental policy resulting in the formation of commissions in many of the states and dwelling for a moment on the conditions which have inspired regulatory legislation, he passed on to a discussion: (1) of the benefits and advantages of regulation, not only to the public, but to the companies themselves, and (2) to point out some of the dangers and disadvantages which would result from unwise or corrupt regulation.

An administrative paper entitled "Recent and Proposed Legislation Affecting Public Utilities" was next read by Norwood W. Brockett, secretary of the Association, who is affiliated with the Puget Sound Traction, Light & Power Company, of Seattle.

Legislation Affecting Public Utilities.

This paper contains a résumé of bills which were passed and some which failed to pass the recent sessions of the legislatures of the Northwest states. The most important act passed by the Washington Legislature was the Electrical Construction Code. The bill as originally introduced was prepared by the electrical workers' union and contained only their ideas. After a hearing by the House Committee a new bill was framed jointly by the representatives of the labor union and of the public-service companies and a compromise measure was thus enacted. The provision in the Public Service Commission Act making it obligatory upon the Tax Commission to assess a public utility for taxation purposes at a value no lower than that found by the Public Service Commission for rate-making purposes was repealed. The effort to pass a "home rule" bill vesting regulation of utilities in local city councils failed. In Oregon a Workman's Compensation Act, an act providing for a 10-hour work day, two laws affecting the taxation of utility companies, a blue-sky law, and a law requiring the use of electric head-lights on railways having more than 50 miles of track were passed. In Idaho a Public Service Commission was created and the law differs from those of Washington and Oregon in giving the Commission power to protect a company against competition by requiring a certificate of convenience and necessity for any new utility company. As to future legislation, the author advocated conferring this power upon the public-service commissions of the other states and giving them control over municipally owned and operated utilities.

Y. M. White, treasurer of the Washington Water Power Company, Spokane, Wash., delivered a highly interesting paper at the afternoon session. It was entitled "Mechanical Devices in the Accounting Department," and will be found elsewhere in this issue.

"The Valuation of Electric Utilities" by Henry L. Gray, former chief engineer of the Public Service Commission of Washington, discussed the methods employed in, cost of, and the benefits to be derived from, the appraisal of electric light and power properties, with particular reference to the valuation of the property of smaller companies.

"Management of a Commercial Department" was then presented by A. C. McMicken, sales manager of the Portland Railway, Light & Power Company.

The Management of a Commercial Department.

This paper presents three plans of organization for commercial departments, diagrams of which are shown. In each of the plans the salesmanager has supervision over light and power billing either directly or through a subordinate, and also has supervision over service inspections, installations, disconnections and meter installations. The paper explains that the advantages accruing through commercial department supervision of light and power billing are clearly apparent to salesmanagers and have, in every central station where this plan is in use, demonstrated the worth of this method. More or less friction always exists between the accounting and commercial department, which is often productive of much complaint from customers, if not actual loss of business. The accounting department, coming less in contact with the public, is prone to give too little consideration to customers' complaints and is further handicapped through lack of facilities for proper investigation. Co-ordination of these departments under the sales-manager has reduced friction and has established more pleasant relations with

customers. It is pointed out that in many companies there is a sad lack of co-operation between the operating department and the commercial department in the matter of service inspections, connections, etc. A service superintendent having charge of these matters and reporting to the salesmanager would eleminate the trouble.

The Friday morning session was opened by the reading of an engineering paper entitled "Use of Protective Relays on Transmission Systems" by S. C. Lindsay, of the Puget Sound Traction, Light & Power Company, Seattle.

Use of Protective Relays on Transmission Systems.

The obligations of public-service companies to maintain supply without interruptions have ceased to be a matter of mere business policy and have become a public necessity. Companies operating steam plants with storage batteries floating on their direct-current systems have not realized the serious problems involved in getting protective apparatus for their alternating-current systems which will afford continuity of service approaching that of the direct-current systems. Companies operating water-power plants and transmission lines have recognized the complete inadequacy of the protective relay apparatus, but have not remedied conditions. The problem is to so arrange transmission lines and feeders and adjust the protective apparatus as to obtain selective action. The writer refers to the various types of relays upon the market and the history of their introduction. The clock-type time-limit relay and the bellows-type inverse-time-limit and definite-time-limit relays have been on the market for over a dozen years. The watt-hour-meter type is of later design. The conditions under which relays may be arranged to operate are listed and general rules for their application given. Adequate relay protection is largely a matter of cost. The Puget Sound Traction, Light & Power Company, at a cost of $6,000, has remodeled its entire protective relay system so that any unit having a fault will be automatically disconnected without causing undue disturbance to the system. Next in importance to selecting the right relay for the right place is the proper load and time adjustment of all relays on the system. The results of experiments are given in which seven types of switches were tested. The most rapid switch required 0.07 second and the slowest 0.28 second. Tests were also made on relays of the bellows type with inverse-time limit and definite-time limit and upon the watt-hour-meter type with inverse-time limit. It was found that the shortest time in which the bellows type relay closed the trip-coil circuit of oil switches was 0.05 second. Adding this to the time lag of the switch, the nearest approach to instantaneous opening was 0.12 second. Another test showed that inverse-time relays become almost instantaneous under short-circuit conditions. The writer concludes that some form of watt-meter type of relay will have to be used wherever close adjustments for time and load are required. He advocates testing relays by applying short-circuits to the system under conditions that will permit observations of performance to be made.

V. H. Greisser, electrical engineer of the Washington Water Power Company, Spokane, next read a paper entitled "Some Features of the Washington Construction Rules."

This was followed by a commercial paper entitled "The Industrial Application of Electrical Heating," by W. H. Lines, of the Portland Railway Light & Power Company.

At the afternoon session there was a paper read by A. E. Ransom, of the Caldwell Machinery Company, entitled "Electricity in the Lumber Industry." This elicited lively and interesting discussion. It set forth data showing the conditions and results of electric operation in a number of sawmills.

Much attention has been given during the past few years to improving the accounting methods of electric utilities, as was evinced in the paper delivered by O. B. Coldwell, of the Portland Railway Light & Power Company, which was entitled "Synchronizing an Electric Light & Power Company's Records and Accounts with the Characteristics of Its Business."

This paper divides the activities of the central station under the following heads: Source; Generation; Transmission; Transformation and Storage; Distribution; and Utilization. The accounts to be maintained under each division are described and by means of mathametical formula the relationships of the various classifications shown.

On Friday the following officers were elected to serve during the ensuing year: H. L. Bleecker, Washington Water Power Company, Spokane, president; E. G. Robinson, Jim Creek Water, Light & Power Company, Arlington, vice-president for Washington; Franklin T. Griffiths, Portland Railway, Light & Power Company, vice-president for Oregon; John McKissick, Northwest Light & Power Company, Wallace, vice-president for Idaho; Norwood W. Brockett, Puget Sound Traction, Light & Power Company, Seattle, secretary-treasurer. M. C. Osborne, Washington Water Power Company, Spokane, and P. A. Bertrand, Grays Harbor Light & Power Company, Aberdeen, were named as additional members of the Executive Committee.

Entertainment.

A. A. Miller, chairman of the entertainment committee, had entire charge of the program of entertainment which was as follows. On Thursday, September 4, the wives and families of the visiting delegates were entertained with an automobile ride which traversed the principal boulevards and parks of the city. On Friday the delegates, with their wives and families, were taken for a three hours' automobile ride about the city. In the evening of the same day, the visiting ladies were entertained at a theater party, and the men at the annual banquet at the Hotel Washington. This banquet was a feature of the convention, and there were present at the banquet-board a representative number of Seattle's prominent business men.

On Saturday the delegates and their families were the guests of the Puget Sound Traction, Light & Power Company, on a boat trip across the Sound to the Puget Sound Navy Yard at Bremerton, Wash. Special arrangements were made to permit the delegates to go through the various buildings at the yard, and also to visit the warships.

The New York Electrical Show.

Broader, in an industrial sense, than any of its predecessors, the Electrical Exposition and Motor Show to be opened at Grand Central Palace, in New York City, on October 15, promises to be historic in its influence toward the general use of electricity in manufacturing. Every effort is being bent toward making the exposition building the Mecca for manufacturers and business men as well as salesmen and buyers of electrical apparatus. In a word, the exhibition, this year, is to be primarily of an educational nature and each display is being arranged with an eye toward teaching the visiting manufacturer just how much he is sacrificing by not adopting electricity as his motive power.

There are also other reasons why the show will be the most important in the history of electricity. For instance, the motor vehicle is given a more prominent place than ever, and arrangements have been made to devote almost an entire floor of the palace to the electric automobile manufacturer. Besides the usual demonstration track, a fireproof model garage for the storing and maintenance of electric cars will be located on the third floor. The garage will be fully equipped with electrical vacuum cleaners, tire pumps, car-washing machines, charging boards and current rectifiers, and will include a repair shop and battery room each fitted out with the latest electrical appliances.

One of the features of the exposition will be an "Electric Farm" occupying 90 feet or more of show space and including every kind of farm work into which electricity has been introduced. First of all will come the cow-milking exhibit. Here a herd of Jersey cows will be milked by an electrically operated milking machine and milk clarifier. The next exhibit will probably be that of an electrical dairy where the milk will be skimmed and butter actually churned from the cream procured.

As a part of the farm exhibition a

portion of the 90-foot space will be turned over to a landscape gardener who will construct a miniature farm with an artificial duck pond. In this portion chickens and ducks will be hatched in electrical incubators and permitted to roam about the little farm at will. Next will come an exhibition of electrical appliances used on a farm, such as house and well pumps, clovercutters, corn-shellers, cider mills, vegetable cutter for cattle, ensilage cutters and blowers, electrical clipping machines, vacuum-cleaning outfits and the like.

In connection with the general farm exhibition the International Harvester Company has arranged to display a model farm nine by eleven feet in dimensions showing fields of alfalfa, an orchard and truck garden with various ditches and methods of irrigating. Water is pumped to a tank on high ground and fed to the irrigating canals by gravity.

Two interesting canal displays have been arranged. One, provided by the State of New York, is a large model of the siphon locks on the Barge Canal. In connection with this, motion pictures of the canal in use will probably be displayed. The other canal exhibit is a twenty-foot model of the Pedro Miguel Locks of the Panama Canal. The model is now in the White House.

There are a variety of Government exhibits, including a money-making exhibit provided by the Treasury Department, a coal breaker in action provided by the Bureau of Mines, a forestry display and an Army and Navy Signal Service outfit. In the first mentioned exhibition raw copper will be started through the same process used in the United States mint, the operations showing the method of rolling, cutting, milling, annealing in a furnace, washing, drying, coining and automatic weighing. But when each coin is completed, instead of being a United States cent, an Edison medal, cast from a special die, will be turned out.

Field wireless and telephone outfits, with wagons provided to carry them, will complete the army exhibit, while a Naval wireless station together with a small Navy machine shop showing the winding of armatures and the making of electrical equipment will compose the Navy Department's part of the exhibit.

Two of the newest features of the exposition will be an electrical clinic where all of the latest electrotherapeutic appliances will be on display, and "talking movies," where Edison's latest invention will be exhibited.

Another interesting portion of the show will be the electric grill, where electricity will be used to do everything from operating the refrigerating plant to furnishing the heat in the range on which steaks and chops are cooked. All of the work will be done in the open where every detail can be plainly seen by visitors to the show.

Then there will be a host of other features, including a display of office equipment such as electrically operated pencil sharpeners, duplicators, typewriters, multigraphs, adding machines, mailometers, scales, punches, stamp perforators, letter openers, time recorders, punching machines, protectographs, check protectors, receipting perforators, calculating machines, cancellors, paper fasteners, numbering machines, rubber stamps, slide rules and billing machines.

Grand Central Palace, Where New York Electrical Show Will Be Held.

Night View of Grand Central Palace, New York.

Drying Peat for Gas Producers.

A recent French patent describes a process whereby disintegrated peat is pressed into a thin cake between two endless filtering bands which pass between perforated metal supporting plates or over a metal pulley and are suitably tensioned. The moisture in the peat is thus reduced 60 to 80 per cent. The peat is then further dried by exposure to hot air or to the heat of the sun. A suitable hot-air dryer comprises a chamber through which large quantities of hot air are blown in the upward direction, whilst the peat cake, in small pieces, travels from the top downwards in a zig-zag path on a series of endless bands.

Electrical Coal-Mine Accidents.

In the first half of 1913, 1,257 men were killed in the coal mines of the United States. Of these fatalities, 41 or 3.3 per cent were due to electrical shocks or burns. For the corresponding period of 1912, there were only 32 fatalities from this cause.

Meeting of Cotton Manufacturers.

The semi-annual meeting of the National Association of Cotton Manufacturers will be held at the Hotel Chalfonte, Atlantic City, N. J., September 30 to October 2.

ELECTRICAL MEN MEET AT CAMP CO-OPERATION.

Important Conference Among Leading Electrical Men Representing Various Departments of the Electrical Industry, Association Island, September 4, 5, and 6.

For several years there has been held at Association Island, Henderson Harbor, N. Y., a conference of the leading men in the electrical industry, representing the various departments of electrical activity. The Association Island Corporation, formed principally by the men devoted to the manufacture of incandescent lamps, has found in Association Island an ideal spot for the establishment of an effective community of interest. They have graciously and generously tendered the full facilities of this ideal location for the holding of the conference and under their auspices have developed an annual feature that is each year becoming of greater importance and significance.

The majority of those in attendance at the conference arrived at Association Island on the morning of Wednesday, September 3. The day was devoted to recreation and the mingling of friends and acquaintances. On Wednesday evening there was an exhibition of Mr. Edison's most recent moving picture films, such as will play an important part in the development of educational features for the dissemination of knowledge concerning those intricate processes of nature and manufacture which have heretofore been unrevealed.

The idea of the conference is to bring together the leaders in each department of the electrical industry, and in addition to the representatives of manufacturers, central stations, the electrical supply jobbers, the electrical contractors and the technical press, there were invited to the present conference the presidents of the various national, state and municipal electrical societies and leagues, together with a number of representatives of the Jovian Order.

Under the inspiration of the leaders in thought who had been called to the conference to present their ideas on the many subjects included in the program, it is expected that these representative men in attendance have returned to their respective communities inspired and stimulated to preach the doctrine of harmony and co-operation among the electrical interests over which their influence may extend.

Formal sessions were held on Thursday afternoon and Thursday evening, Friday morning and Friday afternoon. Each session was presided over by Joseph B. McCall, president of the National Electric Light Association.

The first session was opened on Thursday afternoon with the introduction of Commodore S. O. Richardson, Jr., president of the Electrical Manufacturers' Club, and a leading spirit in the Association Island Corporation. Mr. Richardson welcomed those in attendance to the comforts and enjoyments of the Island, and called upon A. W. Burchard, vice-president of the General Electric Company, who explained briefly the organization of the Association Island Corporation and the ideals of its members in promoting a spirit of generosity, harmony and co-operation throughout the electrical industry. Mr. Burchard then called upon Mr. McCall to become the permanent presiding officer of the conference.

The first speaker was the Hon. Willard Howland, senator from the state of Massachusetts, and chairman of the Massachusetts State Commission of Conciliation and Arbitration. The topic of Mr. Howland's address was "Government in Relation to Business." Senator Howland emphasized the necessity of co-operation upon the part of those engaged in business and particularly in a big and expanding business, with the officers of the government upon whom rested the responsibility of securing to the humblest member of the community an opportunity for the free pursuit of life, liberty and happiness.

Senator Howland was followed by Samuel Insull, president of the Commonwealth Edison Company, Chicago, who spoke on "The Distribution of Electric Energy, Present and Future." Mr. Insull, speaking in his usual forceful and impressive style, captivated his audience with his elucidation of the conditions under which the central-station industry had developed from a matter of insignificant beginnings to the wonderful business that existed today. He showed how with the development of great resources and ponderous units of generating machinery, whole communities were being served adequately and at a cost which made the use of this most beneficial agent of progress available to everyone within its reach. The centralization of power supply would ultimately mean that the work would be done through the medium of electrical energy and the making available immense power-producing stations would so reduce the cost of industrial power that the humblest worker would have conferred upon him benefits of which we do not dream today.

On Thursday evening, Dr. Chas. P. Steinmetz, of the General Electric Company, Schenectady, delivered an address on "The Future Technical Development in the Electrical Business." Dr. Steinmetz said in part that we must judge of the future developments from a study of present tendencies and the trend of development in manufacture and design. The development of the electrical industry is the result of economic laws and the building of electric generators, particularly turbine generators of 30,000 horsepower, made for increasing efficiency, and even larger sizes of machines will be built when the economic conditons demand such structures. Long-distance transmission was on the increase, and it was now possible to transmit energy at 140,000 volts for a distance of 200 miles and more. Large territories are now being served with interlinked systems covering from 10,000 to 20,000 square miles. In the field of incandescent lighting, the present Mazda lamp was five times as efficient as the heretofore widely used carbon lamp, and still higher efficiencies were being produced by the modern luminous and flaming arcs. The power consumed by the electric railways of the country was as large if not larger than the power consumed by the steam roads of the country. The introduction of the trolley has brought about a revolution in social conditions. Great industrial cities could not exist as they do today without means of cheap and quick transportation made available through the coming of the trolley car. New industries in electrochemistry and electrometallurgy have been developed. The separation of aluminum from its ores, the preparation of nitrates from the nitrogen of the air and the preparation of carbides were possible through the medium of electrical energy. In heating and cooking and industrial power applications there has been and will be the most marvelous developments. Electrical energy can be economically transmitted over practically any distance, and the modern industry has to rely upon the transmission of energy. It is in electricity's advantage of economical conversion into other forms of energy that its greatest possibility of utilization lies. It is also possible to concentrate to a very high degree electrical energy. This is an advantage which is possessed by no other form of energy conversion. The one disadvantage that the use of electrical energy suffers from is our inability to store it in sufficient quantities and in a practical way. This is no disparagement in the great progress that has been made in the development of the electrical storage battery. The electrical storage battery, however, stores energy by effecting a chemical change in the contents of the battery and the utilization of electrical energy depends upon the re-action of

the chemical constitutents. The greater use of electricity then depends upon economy of production. The cost of producing energy will not be dependent upon the amount produced, but upon the rate of production. Electrical energy is always an intermediary between energy in nature and energy in the form we desire to use. It is the transmission link. The future development demands that there must be concentration of generation and transmission units, and that where smaller systems are approached by larger systems they must be crushed, absorbed or consolidated. Just as in the development of the steam railway, the network of transmission and distribution will be interlinked so that larger areas may be covered, so that the rate of production may be increased and because of the increased rate of production the cost lowered. An important feature of future development must, therefore, be the designing of controlling apparatus which will limit the destructiveness of these immense amounts of power. Compared with the destructive possibility of a hugh generating and transmission system, the power of Niagara is significant. In Chicago, where the aggregate power uncontrolled is far greater than safe, the problem has been solved. There is no possibility of a destructive aggregation of power, and at the same time all this power is available for useful work. In considering the utilization of electrical energy there is considerable misconception. The question is often raised, "Can this be done electrically?" The question should be, "Can it be done more economically by electricity than by any other method?" Similarly is raised the question as to whether one system of electrical utilization can perform a certain kind of work. The question should be, "Can one system do the work more economically than the other system?" The question fundamentally and ultimately must be "Can electrical energy in one phase or another do the work more economically than anything else?" The question "Can the steam engine be replaced economically by the motor" must be answered by the adaptation of the industry to the characteristics of the motor. In other words, not only must the available power be considered, but often the processes of an entire industry must be reorganized in order that the greatest advantage may be taken of the economic laws governing the adaptation of new forms of power.

Following Dr. Steinmetz an address on "State Commission Control" was made by the Hon. John H. Roemer, chairman of the Railroad Commission of Wisconsin. Mr. Roemer said that the necessity for intelligent regulation of all corporations and individuals rendering public utility service seems to be universally recognized. With the increase of population and the territorial expansion of our cities and villages, the importance of the public services are emphasized. Vast sums of money are invested in the plants rendering these municipal services. As such plants can neither be constructed nor operated except by virtue of a grant from the municipality or state, it is vital to both the owners of such plants and the public that the rights of each and the corresponding duties of the other in respect to the functions of the public utility be clearly defined and appreciated in a spirit of fairness and justice to both parties.

No one can foresee the changes in the arts embraced in public utility services, the developments and necessities of the communities served, or the requirements of the utilities to perform their functions under changed conditions. Under the circumstances it is not at all strange that all attempts to rigidly prescribe in detail the obligations of a public utility to the public, and *vice versa,* during the life of a franchise have met generally with signal failure. When to meet changing conditions attempts have been made to change the terms of the franchise, animosity has been engendered between the public authorities and the management of public service corporations. The suspicion has been that improper methods have been employed to induce consent to terms and conditions detrimental to public interest. As a result such public service corporations become a factor in local politics, and the questions involving the immediate interests of both the public and the corporations have become issues in political campaigns. Such issues often involve economic laws and sound business principles, which cannot be determined by the vote of an uninformed electorate. These unnecessary conflicts between the public and those rendering public service are the cause of more corruption in municipal government than anything else. Mr. Roemer explained the fundamental principles of the Wisconsin Public Utilities Law and the principles upon which the uniform indeterminate franchise had been drafted. He also described the theories underlying the methods of valuation and accounting provided by the Wisconsin Commission and the attitude of this Commission with respect to the regulation of service and rates. Closing his address Mr. Roemer emphasized the importance of bringing to the solution of every problem great breadth of vision and expert and experienced judgment. It was his opinion that the independent tribunal free from local influences and prejudices, and assisted by a corps of trained experts is better qualified to effectively regulate public service corporations than any municipal council or local tribunal.

The Financial Outlook.

On Friday morning Frank Vanderlip, president of the National City Bank, New York, delivered a most inspiring address relating to the financial outlook, paying special attention to its relation to the electrical industry. He said that two billion dollars could be invested in the electrical industries of the country with profit in the next five years. Continuing, Mr. Vanderlip said in part:

"Four hundred millions a year, eight millions a week of fresh capital can profitably be used in the development of the electrical industry in the United States in the next five years. In making such an estimate, one does not need to draw on one's imagination. There is no need to picture broadening fields of application, new methods of production and distribution, nor new uses for current. A survey of what has been going on about us comes near enough to being a fairy tale. Little more is needed than a grasp of present-day statistics, compared pared with those of five or ten years ago, to give the basis for such an estimate.

"When the matter is put so concretely as a new eight million dollar capital issue every week for five years, the size of your financial problem can be readily grasped. To get a full appreciation of the difficulties, you may well glance outside of your own field, however, and note that there will mature within that five-year period well over $1,000,000,000 of steam railroad securities. We may well note, too, that railroad development in the last five years called for from $2,500,000,000 to $3,000,000,000 of new capital, and I would say that there is every reason to expect at least as great demands, in addition to the refunding operations, in the next five years. The railroads, then, in five years will need, say, $4,000,000,000 for refunding and fresh capital. States and municipalities, should they take no more new capital in the next five years than they have in the last five, will absorb in the neighborhood of $1,500,000,000 more, so, with the two billion dollars your industry will need, there should be provided between now and the end of 1918 between $7,000,000,000 and $8,000,000,000 for these three purposes alone, to say nothing of general industrial and other needs.

"Financiers must count on two elements over which they have no control if they are successfully to accomplish the gigantic task. One factor is the size of the possible investment fund itself—the question of whether or not there can be made available a to-

tal amount of capital for fresh investment that will meet the demand which can be clearly foreseen in these three directions alone—that of general transportation, the production and application of electrical energy, and municipal capital expenditures.

"The second factor is whether or not the outlook in these fields of investment is such that the elements of adequate return and ultimate safety will satisfy the owners of capital and lead them to direct such a vast stream of new investment into these fields.

"In spite of the vast proportions that the electrical industry has already reached, the huge total of capital investment which it represents, the substantial standardization of the business, the complete social and industrial necessity which your work has created and met, electrical securities are still regarded by the general investor, the capitalist, as occupying a new and only moderately seasoned and tried field for investment.

"Among ten average investors in corporate securities, perhaps not over one, certainly not over two, have as yet invested at all in electrical securities. I think it is conservative to say that among individual investors certainly not over 20 per cent in numbers have yet recognized that securities issued by electrical corporations have come within a range which will permit investors conservatively to employ their funds in that field. It is not easy for you, perhaps, to realize how very recently it is that the whole field of your business has reached a point where an investor might fairly feel that he was not entering a field of experimentation, that the art was sufficiently advanced and standardized to make it reasonably sure that some brilliant inventor would not upset all financial calculations, that the most up-to-date establishment might not be turned into scrap by advances made in the science long before the investor had made important inroads on the coupon sheet of his bond.

"Four out of five investors at the present time have their minds closed against any investment in securities of electrical corporations, and that is true largely because they fear the effect of present political conditions and tendencies. An investor who has such a fear may not be marching in step to the so-called new freedom; perhaps he does not recognize fully the force of the principles advocated in our new progressive politics. But, remember, he still controls his own capital; remember that it is his individual decision that determines in what field that capital will be invested. The problem that the banker has to face is to convince investors holding such views that capital issues of this type are attractive; and when you ask bankers to convince enough investors of this so that they will absorb $8,000,000 a week of new capital issues you are outlining a large task.

"The time has now come when no man with capital to invest in corporate securities can longer hold back from the study of public utility investments. The experimental inventive stage is past. The business has a background that has now become broad enough so that one can make valuable comparisons and sound deductions. It has ceased to be a business of only small units, and the tendency is markedly in the direction of great capital issues, which shall have at all times a broad market. The dangers from a prejudiced, unwise, and unfair vote by a municipality or a board of aldermen are being greatly lessened by the newly organized public service commissions, and these same bodies, recognizing the monopoly character of the business, are guarding it from useless and venal competition, as they are also guarding the investor from too free capital issues by the optimistic developer or the enthusiastic promoter.

"We are a long way from having either uniform or satisfactory administration of public service commissions, it is true. This word 'commission' has a sound of wisdom, experience, and justice about it, but, after all, commissions are composed of but men, and sometimes of very poorly equipped, even if honestly intentioned, men. All this takes us into the question of government itself, but I think no one will deny that the securities of public service corporations are sounder and their future more secure, on the whole, because of the tendency to place the affairs of these corporations under the control of public service commissions.

"I believe the highest duty that you men who are managing great public service corporations owe to the business in which you are engaged lies in the clear recognition by you of the true public service character of this business and in meeting honestly, intelligently, and freely the proper demands that the public makes upon you."

Principles of Resale Control.

Speaking to the subject "Principles of Resale Control," F. P. Fish, of Fish, Richardson, Herrick & Neave, Boston, Mass., outlined the conditions under which had grown up the conceptions of business methods which a short time ago had been considered highly admirable, but which were today the subject of considerable criticism and antagonism. In the early history of the country there was an eager demand for steam railroad transportation, for enlarged facilities, and individual enterprise was encouraged in every way. In order to encourage the location of manufacturing enterprises communities gave away the land free; taxes were remitted, and in some cases communities even helped finance certain industries. Legislatures, inspired with the idea of expanding industrial facilities, liberalized the laws and capital was attracted to industries through a definitely protected tariff. Administrative ability was idealized and under these conditions the princes of industry brought about an expansion which was wonderful. Very likely in the past in framing the corporation laws too great liberality was extended, but it was with the idea in mind of the most rapid development of initiative and administrative ability. The philosopher of later times in writing the history of the last half of the nineteenth century will concede that it was a most wonderful period of intellectual achievement. It is no wonder that under the extraordinary strain of this terrific progress blemishes were developed. Improved facilities being well established and to a degree becoming commonplace, the public began to notice these blemishes and like many other instances in the history of nations, the public has become unreasonable. The great opportunities for individual acquisition of wealth by men who possibly did not understand the responsbility involved, the acquiring by some men of more money than any man possibly ought to have, appealed to those who were not so successful and brought about antagonism. One form of expression of dissatisfaction of that which was heretofore considered admirable is the over-pressure of consideration for the small man. This feeling, if developed, is capable of doing great harm. One of the accidents of this great development was the proposition that the individual must get whatever material he may wish at the lowest possible price. This brought about cut-throat competition. This form of competition was true of the day that developed competition. When a man could bring together such resources as would allow him to so increase production that the unit cost could be lowered and in order to drive others in competition with him out of the business, he lowered the cost inordinately. This would have been all right for this particular man if the others could not survive, but, when to meet this condition costs were cut all around it became destructive. Directly bearing on the question of resale control there must be some method by which the manufacturer should be able to establish a price below which a material could not be sold, and in the old days a manufacturer could come in

direct contact with the people to whom he desired to sell and he could say, "this is my price, and unless you pay it you cannot have the article. Under the present conditions of merchandising the manufacturer cannot establish a store in every community and cannot come in direct contact with the consumer. He must use the modern methods of distribution and maintain a standard price in order that the goodwill and interest of the retailers may be secured. Mr. Fish reviewed the decisions of the Supreme Court in the case of the Miles Medical Company, and showed that by the expedient of holding and continuing direct control over the distributors of these articles as the agents of the manufacturers it had been possible to establish on a lawful basis a control of the ultimate selling price, where under the other conditions using the modern methods of distribution it had been held unlawful. He also reviewed the decision of the court in the Sanatogen case in its connection with the sale of a patented article. He emphasized very strongly the absolute necessity of the inventor being guaranteed the full assurance given him by the protection of the patent system, and the necessity of the manufacturer being able to retain the good will of the retailer and maintain a system of doing business which was essential to his success. No matter how severely the captains of industry of today may be criticised, and no matter how bitter may be the antagonism to big business today, 50 years from now it will be written down that in this period of extraordinary strain, wherein a great deal of good was accomplished, defects were naturally inevitable. Never was there more material achievement accomplished than in the last half of the nineteenth century. Never was there a time when men were more devoted to attaining success, not for the material achievement which is inseparable from success, but because of pride of achievement and pride of work. Never was there greater loyalty to sound ideas and never was there more thorough co-operation from the princes at the head of the organizations to the humblest man in the ranks than is exhibited today, and he ventured to prophesy that the period through which we have just passed will stand for the admiration of future generations.

Dr. Steinmetz on Competition.

Discussing Mr. Fish's address, Dr. Steinmetz said that after all the fixing of a resale price is the elimination of competition between jobbers and the retailers, and the opposition against it in the public opinion is the same opposition against eliminating competition which one meets all over the country, and which is the foundation of all opposition to the corporation. In the public mind competition is still the foundation and driving force of our industrial progress. Our great national economists are still preaching and believing that competition has made and is driving forward our industrial progress. They have not realized that competition is dead as an industrial and economic force. Competition died on the day on which the advance of engineering had increased the means of production of a commodity beyond the maximum amount which could be consumed under the existing social conditions. On that day competition ceased to be a progressive driving force, and became a destructive force. The idea of competition as a benevolent force in the industrial progress was based upon the theory that by competition between the producers prices would be lowered down to near the cost of production, stopping just as much above the cost of production as is necessary to give a fair profit. But the fallacy involved in this reasoning is the neglect of the economic law that it is financially more economical to operate a factory or an industry at a loss than it is to have it stand idle; because to have an industry, a factory, stand idle, involves the continuous expense in fixed charges. The result is that unlimited competition, with the ability of producing beyond the demand, forces the prices down not to the value giving a fair profit above the cost of production, but the dropping of price stops only there where it would begin to get cheaper to stop production, that is, where the loss in production exceeds the loss of having the industry stand idle. The limitation of price forced by competition therefore is below the cost of production, and as the result the level reached by free competition is an unstable condition, a condition of production at a loss, which can exist and continue for a limited time only, but finally ends in receivership, and the destruction of the industry.

The Society for Electrical Development.

Friday afternoon was devoted to a great degree to a discussion of the plans and progress of the Society for Electrical Development. The opening gun was fired by J. Robert Crouse, who discussed the principles involved. Mr. Crouse showed that an estimate of the sales expense of the central stations, manufacturers, electrical supply jobbers, electrical dealers and contractors amounted in 1912 to approximately $80,000,000. This $80,000,000 of sales effort is incurred by approximately 5,000 central stations, 500 manufacturers, 200 jobbers, 5,000 dealers and contractors, a total of 10,700 organizations. A great deal of this sales effort is competitive and unproductive. It results in extensive duplication of all kinds of sales effort and a failure to co-operate in a definite organized plan. Through the Society for Electrical Development it is planned to take a very small part of this $80,000,000 of unorganized and competitive sales effort and actively exert a co-operative and organized effort to promote and popularize electrical service. The Society creates an organization and a fund through which some of our dollars can co-operate with the good will of all of us in broad effective activity for the expansion of the market, while we continue with the most of our dollars to compete for our fair share of the present and the increased business.

Mr. Crouse was followed by J. M. Wakeman, general manager of the Society for Electrical Development, W. E. Robertson and Henry L. Doherty. Mr. Wakeman reported that approximately $140,000 of the original fund of $200,000 with which it is expected to begin work, was already pledged, and that plans had been made for a campaign among the interests involved which would make available in the very near future sufficient subscriptions to begin the work before the end of the year. In this connection Mr. Wakeman explained the participation of the Jovian Order, which it is expected will result in a widespread dissemination of information relating to the Society, and the adhesion of many new subscribers.

Thomas Darlington, secretary of the Welfare Commission of the Iron and Steel Institute, of New York, and former health commissioner of the city of New York, delivered a very interesting address on "Favorable Conditions for Labor." He exhibited many lantern slides showing how the iron and steel industry had very greatly improved the conditions of labor. Dr. Darlington's whole address was a startling commentary on the fact that welfare work, which had been begun in a spirit of philanthropy, had been discovered to be absolutely capable of returning in actual dollars and cents a large dividend upon every item expended in the promotion of better conditions throughout the entire field of labor.

The conference closed with a number of short addresses on behalf of various organizations represented, those participating in this discussion being as follows:

A. W. Berresford, vice-president, American Institute of Electrical Engineers; representing C. O. Mailloux, president.

Frank W. Smith, vice-president, Electric Vehicle Association of America; representing Arthur Williams, president.

Norman Macbeth, vice-president, Illuminating Engineering Society; representing Preston S. Millar, president.

S. O. Richardson, Jr., president, Electrical Manufacturers' Club.

W. E. Robertson, Electrical Supply Jobbers' Association.

Ernest McCleary, National Electrical Contractors' Association; representing Ernest Freeman, president.

F. E. Watts, Jupiter of the Jovian Order.

Mr. McCleary, representing the National Electrical Contractors' Association, was warmly applauded when he reported that as a result of the participation of the contractors in the conferences which had been held heretofore there had been stimulated a very great increase in harmony and co-operation. At the recent meeting of the Electrical Supply Jobbers' Association at Chicago, the president of the National Electrical Contractors' Association had been an honored guest, and the jobbers had extended the glad hand of fellowship and had appreciated his words of counsel. At the recent meeting of the National Electrical Contractors' Association at Chattanooga, a representative of the jobbers had been present and the contractors had acknowledged to him their hearty appreciation of his presence, and his words of inspiration. Mr. McCleary also showed that real co-operation had been arrived at as was demonstrated by the fact that among the subscriptions which had already been made to the funds of the Society for Electrical Development, the contractors of the country led in point of numbers.

During the week there was a great deal of pleasant recreation, the delightful facilities of the island being greatly appreciated by all in attendance. There was plenty of base ball, tennis, bowling, bathing, boating and fishing. On Friday evening Elbert Hubbard delivered a very interesting talk on "Co-Operation," which was greatly appreciated, as was also the beautiful edition de luxe volume by Mr. Hubbard, entitled "A Little Journey to the Home of Thomas Alva Edison," which was presented by the Association Island Corporation to its guests. One of the pleasant features of the meeting was the sending of a telegram of condolence to George F. Morrison, who is confined to his home by reason of illness, and the cheering response from Mr. Morrison to the effect that he would soon be up and about.

Among those in attendance were many who had enjoyed in other years the hospitalities of the Association Island Corporation. These voted that if it were possible, former generosity had been outdone upon the present occasion. For them and those who had not been there before, there was passed a sincere vote of thanks to the Corporation for the good time and the inspiration that had been brought about, and the expression of a pressing desire that all might be considered fortunate in meeting again under such happy auspices upon another occasion in the future.

Among those present were the following:

Central-Station Representatives.—Henry L. Doherty, New York; Samuel Insull, Chicago; Joseph B. McCall, Philadelphia; A. L. Dodd, Charles City, Ia.; E. S. Wilde, New Bedford, Mass.; E. W. Lloyd, R. F. Schuchardt, Chicago; Arthur Williams, New York; A. B. Lisle, Providence, R. I.; Joseph E. Montague, Niagara Falls, N. Y.; John W. Lieb, New York; Frank W. Smith, New York; C. V. Taylor, Charlotte, N. C.; George Williams, New York; J. J. Frey, Hillsboro, Ill.

Electrical Supply Jobbers.—W. E. Robertson, Buffalo, N. Y.

Electrical Contractors.—Ernest McCleary, Detroit, Mich.

Jovian Order.—Frank E. Watts, Jupiter; George C. Richards, Statesman, Chicago; James Bennett, Statesman, Montreal; H. B. Kirkland, Statesman and Past Jupiter, Pittsburgh, Pa.; Clyde C. Miner, Springfield, Ohio.

Manufacturers.—E. W. Rice, president; A. W. Burchard, vice-president; J. R. Lovejoy, vice-president; O. D. Young, vice-president; Theodore Beran, A. D. Page, George C. Osborn, R. Parker, F. M. Sanford, F. H. Gale, W. H. Stickney, Dr. Charles P. Steinmetz, General Electric Company; T. W. Siemon, treasurer; G. Brewer Griffin, Westinghouse Electric & Manufacturing Company; Walter Cary, Charles A. Terry, Westinghouse Lamp Company; F. S. Terry, A. S. Terry, J. Robert Crouse, J. B. Crouse, B. G. Tremaine, National Electric Lamp Works of General Electric Company; E. H. Haughton, Bryan-Marsh Electric Works, Chicago; L. P. Sawyer, Buckeye Electric Works, Cleveland; A. E. Williams, Colonial Electric Works, Warren; N. L. Norris, Banner Electric Works, Youngstown; C. O. Brandel, Peerless Electric Works, Warren; S. O. Richardson, Jr., Libbey Glass Company, Toledo; Conrad Hubert, American Ever Ready Company, New York; W. A. Layman, president, Wagner Electric Manufacturing Company, St. Louis, Mo.; B. M. Downs, Hemingray Glass Company, Covington, Ky.; J. S. Crider, National Carbon Company, Cleveland, Ohio.

Technical Press.—H. M. Wilson, vice-president, McGraw Publishing Company; A. S. McAllister, editor *Electrical World;* Norman Macbeth, editor, *Lighting Journal;* A. A. Gray, managing editor, ELECTRICAL REVIEW AND WESTERN ELECTRICIAN.

Annual Report of the Commissioner of Patents.

The annual report of the Commissioner of Patents, covering the business of the United States Patent Office for the year ended December 31, 1912, has just been made public. It shows a total of receipts from all sources of $2,118,158.30 and expenditures of $2,022,066.11, leaving a surplus for the year of $96,092.19. This, added to the net surplus already in the United States treasury credited to the Patent Office, makes the total net surplus on December 31, 1912, aggregate $7,160,017.95.

There were received during the year applications for patents for inventions totaling 68,968; applications for patents for designs, 1,850; applications for reissue of patents, 158; applications for registration of trade-marks, 7,215; applications for registration of labels, 885; applications for registration of prints, 309.

The total number of patents on inventions, including designs, issued during the year was 37,573; the number of patents reissued was 158; giving a total issue of 37,731. Of the patents on inventions issued, 33,050 were granted to citizens of this country and 4,489 to citizens of foreign countries. There were 5,020 trade-marks registered, 633 labels registered and 243 prints registered. The number of patents expired during 1912 was 20,883.

The report was signed by Edward B. Moore and was dated August 14, 1913, the day before he retired from office to be succeeded by Thomas Ewing. Contrary to usual practice the report contains no comments on the general status of the Patent Office.

The Mazda Half-Watt Lamp.

Samples of the new tungsten-filament lamp having a specific consumption of only 0.5 watt per candle have been in operation for some time in Mazda House, the show room of the British Thomson-Houston Company, London.

In general appearance the lamp is not substantially different from the ordinary high-candlepower lamp at present in use. The filament is relatively short, concentrated in a compact, closely wound coil, and operates at a very high current density. The bulb is filled with an inert gas.

The units displayed were of approximately 1,400 candlepower, and it is stated that only sizes above 300 candlepower will be manufactured at first. Even these will not be put upon the market for some time. This new type of lamp has been developed at the Research Laboratory of the General Electric Company, Schenectady, N. Y., by Irving Langmuir and his assistants.

Historic Gavel for Illuminating Engineering Society.

At the opening session of the convention of the Illuminating Engineering Society to be held at Pittsburgh, September 23, Prof. George A. Hoadley, on behalf of the Philadelphia Section, will present to the Society a gavel that forms a miniature exhibit of the development of artificial illumination in America.

The gavel, illustrated herewith, is an exceedingly unique composition and reflects great credit on those responsible for its construction.

Beginning with the candle and continuing through to the vapor-tube and magnetite-arc lamps, the various forms of illuminants are represented. The candle is shown in the tin handle from the candle-making apparatus, presented by Professor Hoadley.

The oil lamp is represented by two pieces of iron obtained from a bracket, the designs and makings of which were supervised by Benjamin Franklin. The several brackets were used to hold oil torches in Independence Square, Philadelphia. These were presented by Dr. Hollis Godfrey, chief of Bureau of Gas, Philadelphia.

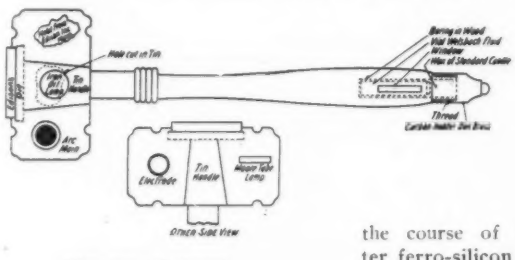


Diagram of Gavel.

The gas mantle enters the construction by means of a vial of original Welsbach lighting fluid made in Welsbach's laboratory in 1887, contributed by the Welsbach Company, Gloucester, N. J.

The arc lamp is shown in an electrode used in the first magneite-arc lamp in 1903, contributed by Dr. C. P. Steinmetz, and a carbon holder used in Thomson-Houston Lamp No. 9, contributed by Prof. Elihu Thomson.

Arc lighting is represented by a piece of single conductor cable installed by the Municipality in Philadelphia about 1890 for arc lighting. Contributed by Clayton W. Pike of the Electrical Bureau, Philadelphia.

The incandescent lamp plays a part in the construction by means of a die used by Thomas A. Edison in his early experiments in making paper filaments in 1879, contributed by G. H. Stickney and J. W. Howell.

The vacuum-tube lamp enters the gavel through a piece of electrode of one of the Moore Light vacuum tubes, used at the first New York Electrical Show held at Grand Central Palace during May, 1896, contributed by D. McFarlan Moore.

A piece of the first Edison three-wire cable installed in Philadelphia for electric lighting service, presented by the Philadelphia Electric Company, serves to represent electric lighting service; while the gas industry is represented by a piece of a gas holder of 85,000 cubic feet capacity, designed in England and built in Baltmore by the first gas company in America, the Gas Light Company of Baltimore, established in 1816; contributed by George Beadenkopf.

Electric Iron-Ore Smelting in Sweden.

Electric iron-ore smelting is making comparatively rapid progress in Sweden, several installations already being in operation, and the erection of others under contemplation. At the Stord Kopparbergs Bergslags Company electric iron-ore smelting has been going on for some time, both in the furnace started in 1911 and in a 6,000-horsepower furnace completed in the course of last year; in the latter ferro-silicon is being produced. An electric pig-iron furnace of the Helfonstein type, owing to certain circumstances, was not completed during 1912, but is likely to be started before long. A series of experimental smeltings have been going on in a smaller, older electric furnace so as to ascertain the suitability of charges of different kinds of iron for electric smelting. At Kirunavaara the erection of some electric iron-ore smelting furnaces has been proposed by the well-known expert, A. Grönvall, who has applied to the Government for a concession to reduce, electrically, the so-called A ore at the place where it is being broken. The plan comprises the building of two electric furnaces, each of 4,000 horsepower capacity. The installation is expected to be ready in the beginning of 1915, at the same time that electric energy from the state hydroelectric power station at Porjus should be available.—*Engineering.*

Historic Gavel to be Presented Illuminating Engineering Society.

Another Power Plant Destroyed.

The electric power station of the Texas Light & Power Company at Palestine, Tex., was destroyed by fire on August 28.

BOOK REVIEWS.

"Thirty Years of New York—1882-1912." New York: The New York Edison Company. Paper (boards), 264 pages (6¼ x 9¼ inches), illustrated.

This book, of beautiful printing and paper, is from the press of the New York Edison Company, and is a history of electrical development on Manhattan Island and in the Bronx. The first of the many artistic and historical illustrations with which the book abounds is that of the Waterside Edison station viewed from Long Island City, across the East River. Among the other excellent and speaking pictures that appear are those of New York of 1880; "Bonfires on Election Night," of the same date; Printing House Square; Edison's Menlo Park home; the first Edison lighting station (1882); lower New York at twilight; several of Thomas Nast's cartoons of the early eighties; and many views of the brilliantly electrically illuminated New York of the present day. Riverside Drive as illuminated for the United States fleet in 1912, the Court of Honor for the Hudson-Fulton celebration, and the Soldiers' and Sailors' Monument illuminated for the same occasion, are portraits of present-day decorative electric lighting. The text is all interesting and historically valuable, a poem on "Electricity," by that unique writer, W. J. Lampton, saying, among other things:

"How young you are,
And yet how you have grown
Essential to mankind!"

The author's name is not given, but the book, while local to New York, in valuable data and interesting description is worthy of a place in every electrical library.

"Electric Wiring." By Joseph G. Branch. Chicago: The Joseph G. Branch Publishing Company. Cloth, 280 pages (5¼ by 7½ inches), illustrated. Supplied by the Electrical Review Publishing Company for $2.00.

This is the second edition of a practical book on the subject of electric wiring. It has been carefully revised and while the first edition received a favorable reception, the publishers are of the opinion that in its new form it will prove even more popular. The subject matter is treated as a series of questions and answers. A carefully arranged index makes any subject easily discovered.

New Electrical and Mechanical Appliances

Switchboard Signaling in the World's Largest Power Station.

In the mammoth power stations of the present day, the generators are very often remote from that wonderful piece of mechanism, the modern switchboard, yet no time must be lost in transmitting instructions from the switchboard to the operator in charge of the big machines. The high standard of service maintained by the large power companies makes it imperative that the signal system for transmitting such instructions be so reliable that the probability of an error is eliminated.

In the world's largest power house, the Keokuk generating station of the Mississippi River Power Company, it is more than 800 feet from the switchboard to the most remote generator and no part of the generator room is visible from the switchboard owing to the fact that the latter is installed in an upper story. For this reason, no efforts were spared to make the signal system as dependable as possible.

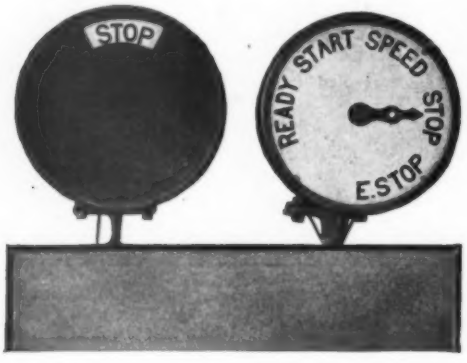


Fig. 1.—Transmitter and Receiver for Mounting on Benchboard.

Fig. 2.—Transmitter and Receiver at Generator.

Transmitters and receivers are installed on each benchboard, the number corresponding to that of the generators controlled by it and also one receiver and transmitter is placed beside each generating unit. The left-hand dial of each switchboard set is the transmitter, while the upper dial of the pedestal set is the corresponding receiver at the generator. The lower dial of the pedestal set is the generator attendant's transmitter, while the right dial in the switchboard set is the corresponding receiver.

The transmitter of the switchboard set is operated by means of a handle, pointer, and dial mounted on the front of the benchboard and concentric with the handwheel which operates the field rheostat of the corresponding generator, the motion which sets the pointer of the transmitter at whatever signal it may be desired to transmit being communicated to the transmitter by means of a cable and pulley arrangement. The pointer of the corresponding receiver in the generator room instantly points to the same signal.

The synchronous motion of the pointers of the transmitter and receiver is secured by means of small induction motors each provided with a three-phase delta-connected stator winding and a single-phase rotor winding of the shuttle type, the windings being exactly alike in all the machines, and corresponding dials having their signals at exactly the same points with respect to the winding.

Motors for corresponding transmitters and receivers have their stator windings connected in multiple but not excited except by induction from the rotor winding. The rotors are also connected in multiple and excited from a single-phase source. With two motors connected thus, any motion of the rotor of one is accompanied by a corresponding motion of the rotor of the other. Thus each will always bear the same relative position to its stator winding. So, in sending signals, the rotor of the transmitter is turned so that the hand pointer on the dial points to the signal it is desired to send and the rotor of the connected machine or machines instantly moves around so that the hand on the dial of the receiver also points to the same signal.

The rotors are excited from a 25-cycle, 125-volt circuit with provisions for automatically throwing them across an auxiliary supply circuit in case of failure of the main source of supply.

Double push-button switches are located on both sides of the transmission handles, and serve to operate signal lamps, whistles and bells.

To send a signal, the switchboard operator turns the handle to the signal he wishes to send, this action moving the pointer on the dial of the transmitter, and, consequently, the pointer on the dial of the receiver at the generator stand, so that they both point to this signal. He then pushes a button on the right of the transmitting handle, thus lighting a lamp on the generator whose operator is being signalled to and also blowing a whistle to attract his attention.

As soon as the operator at the machine has read the signal, he turns the handle of his transmitter to the same signal, thus transmitting the signal he has received back to the switchboard operator as a check. Then he presses the button at the right of his transmitting handle, thus extinguishing the lamp and cutting out the whistle; after which he presses the button at the left of the handle so as to light a lamp in the switchboard room and ring a bell there to attract the attention of the switchboard operator, who, after checking the signal, presses the button at the left of the transmitter handle extinguishing the lamp and cutting out the bell.

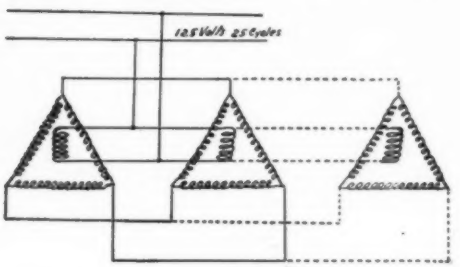


Fig. 3.—Diagram of Signaling Motor-Circuit Connections.

This completes the sending and checking of a signal.

The devices for sending and checking signals as outlined above were manufactured by the General Electric Company, Schenectady, N. Y.

Connecticut Electric Reset Annunciator.

The Connecticut Telephone & Electric Company, of Meriden, Conn., has recently placed on the market a new type of electric reset annunciator. The outfit contains many new and interesting features for the electrical trade. Here-

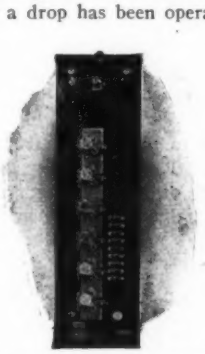
Electric Reset Annunciator, Surface Wall Type.

tofore annunciators have been built mostly of the mechanical reset type. The demand, however, seems to be increasing for the electric reset style and the Connecticut company has felt for some time there is a market for something better in the annunciator line.

The Connecticut annunciator drop

Top View of Drop.

consists of two independent magnet coils. One operates the drop and the other resets it; there are no permanent magnets of any kind. By a unique and positive arrangement only the independent reset magnet is in the restoring circuit after a drop has been operated, thus



Elevator Annunciator, Cover Removed.

one reset button can be used for any annunciator, regardless of size. Each drop is a self-contained unit, and can be removed from the annunciator by disconnecting two wires and removing one machine screw. All drops are mounted on a vertical metal mounting strip which gives a rigid and substantial construction. All parts including drops, bell and reset buttons are mounted on the back board so that when the front of the cabinet is removed, they are accessible in their working condition. This is an ideal arrangement for the contractor. All drops are wired to terminals on the back board with machine binding screws for connecting to line wires. The reset button is also wired to two terminals so that an extension reset button may be used, if so desired. The Connecticut company claims that this outfit occupies less space than most other drops and that the current consumption is extremely small.

Another interesting feature is the fact that if the glass is broken it will not require remarking the drops, because the marking is done on a well finished ferrotype plate and the glass is placed over the same.

Pot-Type Electric Coffee Percolator.

A new percolator, which is simple, handsome, convenient, economical and less expensive than the more elaborate styles, is being introduced by the Westinghouse Electric & Manufacturing Company.

Westinghouse Pot-Type Percolator.

Water is put into the reservoir and coffee into the coffee retainer. The current is then turned on, and in less than 1.5 minutes hot water is forced up through the valve-tube and sprayed over the coffee. The water trickles through the coffee, dissolves the extract, and runs back through the strainer into the reservoir. This operation is kept up continuously until the coffee is of the desired strength. The current is then turned off. A pot of coffee can be made in about 15 minutes. A small quantity requires less.

The parts are shown in the accompanying illustration. All metal parts are strong and rugged, heavily tinned inside, and highly nickel-plated and polished outside. The construction is very simple; nothing to get out of order, very easily cleaned, no valves, no loose pieces; only three parts, cover, body and combined coffee retainer and stem.

The heater is of a special design, projecting from the bottom of the vessel into the water. It is highly efficient, very durable and extremely simple. If always operated immersed in water it would last a lifetime, but if for any reason repairs are needed, new heaters can be easily installed. Connections from the heater are made to suitable terminals carried in the base of the percolator. A six-foot silk-covered cord complete with detachable nickelplated receptacle and attachment plug is furnished with each percolator.

The manufacturer claims the following advantages for this percolator.

The sheet-metal spout, accurately rolled in place and having all soldering done inside, gives a pleasing appearance and great durability. The metal is of a heavier gauge than is ordinarily encountered in devices of this kind, which results in a pot that is strong and not easily dented.

The German-silver coffee retainer guarantees against chemical action and corrosion, and has great durability.

The heater casing is held in place by spinning over the end. This can be readily cut away if for any reason it is necessary to insert a new casing.

The heater unit is insulated by a special cement of high dielectric strength. This cement forms a part of the heater itself and will withstand very high temperatures.

This percolator consumes 380 watts. Its capacity is 2.5 pints of coffee.

Drawback on Electric Lamps.

A drawback allowance has been granted by the Treasury Department on the exportation of electric lamps manufactured by the General Electric Company at its factories in Lynn and East Boston, Mass., with the use of imported globes, bulbs and brass bases.

CONTROL OF ALTERNATING-CURRENT FIRE-PUMP MOTORS.

By Harrison Pierce Reed.

At the present time there seems to be some misunderstanding as to the control of alternating-current motors which drive pumps for fire protection. There also seems to be some question as to the type of motor to use. This is a vital subject and one which is consuming much thought as the present time by the National Board of Fire Underwriters.

The last book of rules issued by the National Board of Fire Underwriters covering all types of fire pumps was published in 1904. These rules have been partially, at least, superseded by the rules made by the same Board in 1911. The 1911 rules bear the title "Rules and Requirements of the National Board of Fire Underwriters for Centrifugal Fire Pumps," and they require a switchboard controlling the motor to contain a suitable switch, a voltmeter, an ammeter and a circuit-breaker. These parts are in addition to the starting apparatus. The rules also require that the switchboard must be protected from water coming in from the possible leakage or breakage of any connections at the pump or other piping in its vicinity. These specifications give in general the requirements for the control board. Much is left to the contractor or pump builder for he must decide upon the type of motor to use.

There are two types of alternating-current motors that have been used for fire-pump work, the squirrel-cage and the slip-ring types. It is generally conceded that the squirrel-cage motor is peculiarly adaptable to many installations due to the fact that it has not the complications of a slip-ring motor. The brushes on a slip-ring motor necessarily have arcing contacts. For fire-pump service, however, where the motor and controller are always properly inclosed, the objections to the slip-ring motor are overcome and there are many reasons why this type of motor is better adapted to fire-pump work.

From an engineering and from a safety viewpoint, the squirrel-cage motor is rather undesirable. The principal objections to this motor are its high starting current and its low starting torque. Combined with these features is the fact that it is impossible for an unskilled operator to accelerate a squirrel-cage motor without danger of taking a very high current from the line, and the possibility of tripping the circuit-breaker. In times of excitement when there is a fire and when the night watchman is liable to be called upon to start the fire pump, he will not wait sufficiently long on the starting tap for the motor to accelerate properly, but will be very much inclined to throw over quickly to the running position. This will draw a very high current from the line, and as in this position the overload release coils of the circuit-breaker are in circuit, the circuit-breaker will be very liable to be tripped out. This will necessitate the re-setting of the circuit-breaker and starting all over again with the resultant delay and probable increase loss of property.

A large squirrel-cage motor will take from 7 to 8 times full-load current with the rotor stalled, and full voltage applied to the motor terminals. Even with the most skillful operator the motor, as ordinarily provided with a potential starter, will take at least four times its full-load current from the line. If the operator is in a hurry, he is apt to make the motor take 6 or 7 times full-load current and under these conditions the circuit-breaker will trip out. In order to equalize the starting surges the operator should leave the motor on the starting tap until the motor has reached 80 per cent of full speed. This takes a comparatively long time and the tendency is to throw the motor on the line too quickly.

Slip-Ring Motor Suited for Fire-Pump Duty.

The low starting torque of the squirrel-cage motor is a very objectionable characteristic for fire-pump service. The starting torque developed on a moderately sized fire-pump squirrel-cage motor with about half voltage at the motor terminals, is not over 25 or 30 per cent of full-load torque. Where such a motor is installed in a comparatively high building, the motor will possibly not be able to accelerate at all on account of the pressure head. The squirrel-cage motor is therefore vastly inferior to the slip-ring motor for fire-pump installations where reliability and ease of operation should be the primary considerations.

In acceleration, the latter type of motor acts similar to the shunt-wound direct-current motor, and while the results in starting are not equal to the compound-wound direct-current motor, the starting torque is sufficiently high to allow the motor to be accelerated quickly and easily without taking a heavy current from the line, and therefore without danger of tripping the circuit-breaker. The slip-ring motor is consequently much better than the squirrel-cage type for fire-pump duty.

The controller for the fire-pump motor must be simple in design, easy to operate and reliable. The Cutler-Hammer Manufacturing Company, of Milwaukee, Wis., has recently put a new type motor-driven alternating-current fire-pump controller on the market. The one shown in the illustration is for a 100-horsepower, 440-volt, three-phase, 60-cycle slip-ring motor. Mounted on the control panel are a voltmeter, an ammeter, a three-pole rigid-arm plain overload circuit-breaker, a three-pole double-throw knife switch, a pressure governor and a combined manual and automatic fire-pump motor starter. At the back of the panel in a suitable angle-iron frame are mounted the cast-iron resistance grids which are used as the starting resistance in the secondary circuit of the motor. The whole controller is inclosed

Combination Manual and Automatic Starter for Fire-Pump Slip-Ring Motor.

in a sheet-iron splashproof case mounted on a pedestal two feet high.

The double-throw knife switch is for transferring the motor from one set of service lines to another, as connection to two separate power lines is often provided for reliability. The starter proper consists of a square shaft above which are mounted the three primary and the six secondary cam-operated switches. There is also an auxiliary cam-operated switch at the extreme right, the function of which is described below. The cam shaft, which actuates these switches is revolved for manual operation by a hand lever shown at the extreme left of the shaft.

Manual Operation Important.

The manual operation is of prime importance, and it is only necessary for the operator (who may be an inexperienced night watchman) to pull the hand lever from the upper position through 180 degrees to the lower or full running position. The lever is held in the running position by an automatic coil. The movement of the lever above described first closes the three primary switches simultaneously and then closes the secondary resistance switches in proper succession, until the motor is brought up to full speed. The secondary switches are so designed that the resistance is cut out of each phase at the same time in equal portions and thus the motor is kept balanced throughout the starting period. On failure of voltage or at the will of the operator the switches are all opened, the shaft being returned by a heavy clock spring.

Need for Automatic Control Also.

If automatic control can be conveniently incorporated without complication of the hand operation, it gives a satisfactory method for maintaining a constant water pressure when a single sprinkler head opens or when a leak developes in the piping system. Furthermore the automatic operation provides a safety feature which is not available in a straight hand starter. Watchmen are prone to leave the building or the section of the building where the controller is installed and in case of fire the automatic control feature is a decided advantage, as it puts the pump in operation and keeps the pressure up to maintain a sufficient water supply.

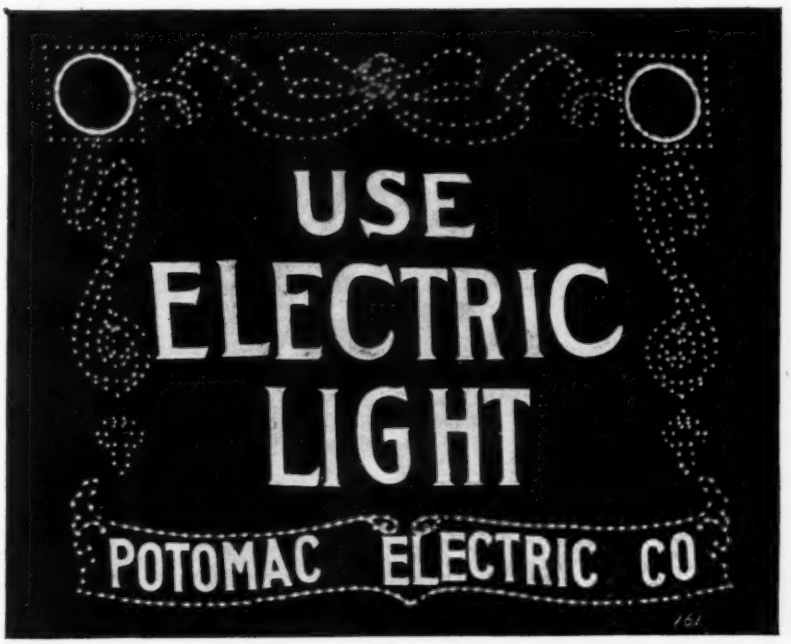
As in the hand operation the cam shaft is revolved to start the motor, but the operation in this case is taken care of automatically by a pilot motor mounted on a bracket below the righ-hand portion of the shaft. This motor drives the shaft through a worm-gear reduction box, the gears running in oil. A solenoid-operated clutch is between the reduction-gear box and the cam shaft. The automatic starting operation is as follows: When the pressure in the tank or stand pipe falls below a predetermined amount, due to opening of sprinkler heads, leaks, etc., the pressure governor closes the control circuit for a small two-pole magnetic switch located just above the cam shaft at the right-hand end. This switch closes and opens the pilot-motor circuit. At the same time the governor closes the clutch-solenoid circuit. The pilot motor revolves and a spring behind the movable jaw-clutch member is compressed by the clutch solenoid. As soon as the jaws match, the spring causes the clutch to engage and the cam shaft is revolved The three primary switches are closed quickly due to the shape of their cams. The secondary switches are then closed in succession, cutting resistance out of the motor rotor circuit just as in the case of hand operation. After the last secondary switch is closed, the auxiliary cam switch opens and drops out the pilot-motor switch, thus stopping the pilot motor and preventing further revolution of the cam shaft. The worm-gear reduction prevents the motor revolving backwards, and keeps the switches in the running position with the fire-pump motor up to speed.

The clutch solenoid remains in until the pressure in the sprinkler system reaches the required maximum, when the pressure governor opens the circuit to the clutch solenoid, disengaging the clutch. The heavy clock spring returns the cam shaft quickly to the "off" position. The clutch solenoid is therefore the automatic and the no-voltage release, because the solenoid when de-energized allows the starter to return to the off position, stopping the motor.

The entire controller is built to meet the most rigid fire-pump requirements. There are no iron-to-iron bearings and all parts are designed to withstand the effects of periods of idleness in damp locations. A fire-pump controller must be ready to start on a moment's notice, even though it may have been idle for a month or more. The particular feature of this fire-pump controller is its adaptability to either hand or automatic operation without any mechanical change.

Large Spectacular Electric Sign in Washington.

A very large spectacular electric sign, which bids fair to outstrip anything heretofore attempted in the electric display line, was recently installed by the Potomac Electric Power Company in the city of Washington, D. C. This masterpiece was designed and erected by the Valentine Electric Sign Company, of Atlantic City, N. J.



One View of Large Spectacular Sign.

The sign is 40 feet by 40 feet in size and contains 5,000 lamps; 20,000 feet of wire was used. The sign in reality represents two showings; first four zouaves flash on, going through a complete drill, "shoulder arms," "present arms," "parade rest," etc. After completing the drill the words "Use Electric Light" and "Potomac Electric Company" flash on. After holding for some time the operation repeats itself.

Each figure of the zouaves is 30 feet from head to foot and the figures measure 9 feet across the chest. The frame is constructed of angle iron, is

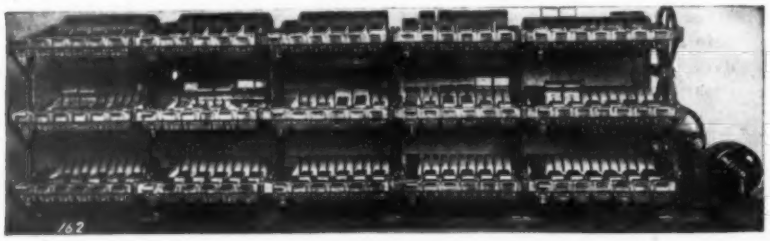
Another View of Large Spectacular Sign in Washington.

made up of the trussed type and is supported on 30-inch I-beams, which support the entire weight of the sign structure. The I-beams, in turn, are supported by the walls of the building and no part of the sign rests on the roof proper.

The color effect is produced by Reco color hoods. The flasher mechanism is both complicated, as well as of unusual size. It is built in three tiers, has 118 switches and was specially designed for this installation by the engineers of the Reynolds Electric Flasher Manufacturing Company, of Chicago and New York.

This spectacular electric sign is nightly being viewed by throngs and has created endless comment and admiration. It has unquestionably proven to be a most profitable investment for the power company as an advertising medium, and may be pointed to as an object lesson for any large advertiser.

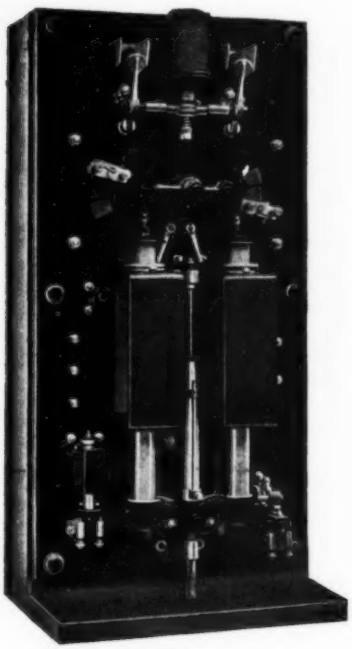
The credit for this fine installation is due to T. E. Valentine, president of the sign company bearing his name and to E. S. Marlow, of the Potomac Electric Power Company.



Special Flasher Used in Producing the Spectacular Effects.

An Elevator Controller.

An interesting type of elevator controller which is now being considerably used in Great Britain is shown in the accompanying illustration, and is made by Thomas Kesnor and Company, Limited, of Watford, England. It is intended for use both on car-switch and push-button passenger and freight elevators, and consists of a double-pole main switch, a reversing switch and a rheostat, all operated by solenoids and all fitted to a slate panel mounted on a cast-iron frame. The circuit through the operating solenoid is made through a car switch or push button. The reversing switch and rheostat brushes are operated by a pair of solenoids, called direction solenoids, which are fitted with specially arranged cores in such a way that only one solenoid, corresponding with the desired direction, is energized at the initial switching on. This throws the reversing switch to the side controlled by the direction solenoid thus energized. At the same time as the reversing switch is pulled over to the desired position, the rheostat brush is moved over a portion of the first contact, without, however, cutting out any of the starting resistance.



Kesnor Elevator Controller.

It will be noted that the bracket which connects the direction-solenoid cores together at their lower ends, and which carries the rheostat brushes, has a pin attached to it, which allows the spring-controlled arm to short-circuit the coil of an electromagnetic switch. When this becomes thus short-circuited and deprived of energy, it allows the switch to spring open and throws the direction solenoids and the main-switch solenoid into series. The main-switch solenoid having thus been energized, the main circuit will be closed and the current will pass through the starting resistance and motor. The direction solenoids now in series exert their pull on the lower cores and draw them upward against the pressure of an

adjustible oil dashpot. In this way the rheostat brushes are moved over the various steps on the rheostat, cutting the starting resistance out of circuit and allowing the motor to run up to speed.

When the operation of switching off is taken, the circuit through the controlling solenoids is broken and the main switch, which is fitted with powerful magnetic blowouts, at once flies open and short-circuits the armature by means of the projecting arms, which make circuit with the carbon contacts below the switch. Across these contacts is an adjustable resistance which carries the dynamic brake current. At the same time the direction solenoids, being also deprived of energy, allow the lower cores with the rheostat brushes attached to them to fall and thus bring all the starting resistance into circuit again. At the same time the reversing-switch rocker is brought back into its central position ready for switching on in either direction by means of a non-magnetic telescopic connecting rod between the lower cores and their respective upper parts.

It will be seen therefore that the arrangement of these control circuits and contacts makes it impossible to pass the current through the direction solenoid in order to reverse the direction of the motor until the controller is switched completely off and is standing in its normal or off position. In some cases dynamo-action relays are fitted so as to make it impossible to energize the operating coils until the motor is practically stopped. When it is desired to use the dynamo-action current generated by the motor on switching off, as a retarding load, instead of using the magnetic brake, the use of a dynamo-action relay is most valuable. The controllers are also in some cases arranged to short-circuit the resistance windings of compound motors after the starting resistance has been cut out and they have also been arranged for two-speed elevators.

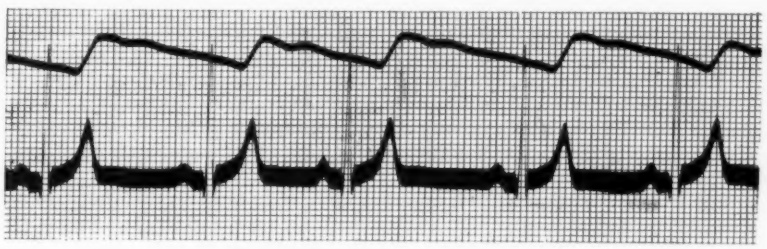
It will be seen that in this arrangement of elevator control some very ingenious and novel features have been introduced which make the controller a most interesting piece of electrical apparatus. There is no waste current in the operating solenoid, one direction solenoid being switched in across the mains and the other direction and main-switch solenoids, which are later on put in series with it, employ the whole of the control energy usefully and at the same time act as cooling resistances. No main circuit is opened except by the main switch, which is fitted with magnetic blowouts and arc shields on both poles; the main circuit is always broken when reversing takes place, and in switching off the reversing switch does not move and never breaks any circuit. The control circuit automatically takes charge of the operations, making the complete controller automatic in its action and therefore foolproof.

The speed of cutting out the starting resistance can be adjusted by means of an oil dashpot, while the dynamic brake resistance is also adjustable, allowing for alteration in the rate of acceleration and retardation in starting and stopping at the various floors. Finally, the controller can be used without alteration for both push-button and car-switch system of control, so that its unique features are obtained without any sacrifice whatever of a very extensive field of application. It therefore constitutes a very good example of high-class design and workmanship in this sphere of electrical work.

Electrical Record of Heart Beats.

Some of the most remarkable measurements made by instruments of the greatest sensitiveness are now accurately recorded for reference and observation on photographic paper by electric registering apparatus.

Even the heart beats of a person are recorded without difficulty, as indicated in the accompanying diagram,



Electrical Record of Heart Beats.

which is an electro-cardiogram and pulse curve of a man of about 20 years of age. In these curves one space of ordinate is equivalent to 10^{-4} volt and one space of abscissa to 0.04 second. This curve was made by means of a string galvanometer at Leiden, Holland, at the laboratory of the Rijks Universitait, by W. Einthoven.

Telephone Service and Modern Business Methods.

An advertisement of the telephone company calls deserved attention to a phenomenon which, while perfectly well known to everybody, has not, so far as can be remembered, ever been noted, or even consciously observed, before. It is that when people talk over the wire they get down to business promptly, say briefly what needs saying, and then ring off.

For the busy man, the saving of time, as compared with face-to-face conversation, is obviously great. Of course, not all have yet acquired what might be called a good telephone style. Now and then one is called, perhaps from an important or trying task, by somebody who indulges in vain repetitions and empty phrases, but at least he does not remark, as do too many visitors to too many offices where work is rushing or wants to, that he "happened to be passing and thought he'd just drop in"—for the minute that usually proves to be half an hour.

That telephones are often used for less than sufficient reason is true, but hardly ever are they used for no reason at all, and the general appreciation of that fact presumably explains why it is that access to the attention of busy or seclusive people is so much more easily secured when it is sought by telephone instead of personally and through the unsympathetic and suspicious boys who guard gates and doors. Almost anybody will respond at almost any time when informed that "You're wanted at the telephone." That summons will make the hungry interrupt their dinners, the editor quit his solemn council with his grave associates, the bank president his directors' meeting, and a tradesman a customer at the counter with money to spend.

Often enough, and too often, we are rendered impatient by these far, faint voices, especially when their owners can't or won't talk so as to be understood, or when we get that most impertinent of commands, "Hold the wire," and have to wait the convenience of somebody who regards only his own and wastes our time to save his. In most cases, however, the user of a telephone has something to say, says it, and stops. The beneficent instrument therefore gives valuable training in the courtesy that is so much higher than the courtesy of arbitrary convention. It teaches the adjustment of word to circumstance. "Long distance" does this best of all, perhaps, for when minutes mean money volubility is beautifully curbed and nobody on other inquiries bent feels obliged to pretend an anxious interest in the health of an acquaintance's newest baby or oldest mother-in-law.—*New York Times.*

Latest Approved Fittings

The electrical fittings illustrated and described in this department have been approved by the Underwriters' Laboratories, Incorporated, following examination and tests conducted under standards of the National Electrical Code as recommended by the National Fire Protection Association.

BINDING POST CONNECTOR.—Sloan Engineering Company, Brooklyn, N. Y.

"Standard" Binding Post Connector. A binding post consisting of a threaded copper stud, washer and nut, brass body and a swivel thumb-nut by means of which a wire may be connected to the post between non-rotating clamping faces of the body and thumb-nut.

Standard for use on instruments and electrical fittings where wires not larger than No. 10 B. and S. gauge are to be connected to it.

Approved August 25, 1913.

CLAMPS FOR FLEXIBLE TUBING.—New Process Specialty Company, Milwaukee, Wis.

Flexible Tubing Clamps. Pressed-metal clamps for supporting flexible tubing and holding the same at outlets.

Type A clamp: for use at combination gas-electric outlets.

Type B clamp: for use at straight electric outlets.

"Universal" clamp; for use with switch and outlet boxes.

Approved May 28, 1912.

CONDUIT, Rigid. — Orpen Conduit Manufacturing Company of Canada, Toronto, Canada.

Clamp for Flexible Tubing.—New Process Specialty Company.

"Xceladuct" and "Orpenite" conduit.

Approved August 14, 1913.

CONDUIT OUTLET BUSHINGS, COUPLINGS AND FITTINGS.—McCabe Supply Company, Wilkesbarre, Pa.

"McCabe" Threadless Coupling: Type B; sizes 0.5 and 0.75 inch.

Couplings designed to connect threaded to unthreaded conduit and having bodies fitted with tapered clamping cones and threaded bushings.

These couplings should not be used as a substitute for regular threaded couplings in general conduit work, but only in places where space and conditions do not permit the usual form of construction.

Approved August 15, 1913.

CUTOUT BASES, Cartridge Fuses.—Connecticut Electric Manufacturing Company, Bridgeport, Conn.

Slate-base cutouts for National Electrical Code inclosed fuses; 250 and 600 volts; catalog Nos. 600-630 inclusive, 622½, 624½.

Approved August 21, 1913.

FIXTURES.—The Albert Sechrist Company, Denver, Colo.

"Sechrist Patent Electroliers."

Straight electric fixtures designed to be readily wired and assembled. Arms or stems are of either round or square tubing. These fixtures have standard bodies and stock arms.

"Sechrist Single Light Fixtures."

A single-stem fixture in which is inclosed a receptacle with sealed-in leads. A brass shell covering the receptacle supports a shade holder.

Approved August 5, 1913.

HEATERS, Electric. — American Electrical Heater Company, Detroit, Mich.

Radiators: 250-4,000 watts, catalog Nos. 4510, 4512, 4530, 4535, 4545, 4555, 4558,4560, 6020, 6125. Fixed-wall type: catalog Nos. 4610, 4612, 4630, 4635, 4645, 4655, 4658, 4660, 6235.

Water urns: 800-2,000 watts, catalog Nos. 4320, 4325, 4330.

Coffee urns: 1,400-4,200 watts, catalog Nos. 4420, 4430, 4440, 4450.

Plate warmers: 300 watts, catalog No. 440.

Laboratory plates: 800-3,300 watts, catalog Nos. 2920, 2925, 2930, 2940, 2950, 2970, 2980, 2990.

Sterilizers: 900 watts, catalog No. 5916.

Glue pots: 500-650 watts, catalog Nos. 141, 143.

Approved August 9, 1913.

MOLDING, FITTINGS.—National Metal Molding Company, Pittsburgh, Pa.

Metal-molding-to-wood-molding connector, catalog No. 369.

Standard for use only where no joints or splices are made in wires, or, where used in conjunction with approved connection blocks for molding wiring.

Approved August 15, 1913.

PNEUMATIC CLEANER. — Wise-Harrold Electric Company, New Philadelphia, O.

"Ohio" Suction Sweeper.

This device is a portable, motor-driven, centrifugal-fan suction cleaner. The motor may be of the direct-current, alternating-current or universal type, but in no case requiring over 250 watts.

Approved August 15, 1913.

RECEPTACLES, FOR ATTACHMENT PLUGS.—Manhattan Electrical Supply Company, New York, N. Y.

Edison screw-shell flush receptacle, 660 watts, 250 volts, catalog No. 6546.

Approved August 4, 1913.

RECEPTACLES, Standard. — Benjamin Electric Manufacturing Company of Canada, Limited, Toronto, Canada.

660 watts, 250 volts; conduit-box type, catalog No. 6B; sign type, catalog No. 6T.

Approved August 4, 1913.

RECEPTACLES, Standard. — Chi-Ill Electric Company, Chicago, Ill.

Sign type, catalog No. 14.

Conduit-box type, with covers attached, catalog Nos. 143, 144, 1433, 1434.

Approved August 11, 1913.

SIGN MACHINES.—Itaska Manufacturing Company, Chicago, Ill.

This device comprises a pair of solenoid coils, a contact device and a rotating wheel which carries terminals alternately brought in contact with two pairs of fixed brushes in series with the lamp circuits. The machine is designed to light opposite faces of a sign alternately.

Molding Filling.—National Metal Molding Company.

Rating: 15 amperes, 125 volts, direct-current.

Approved August 4, 1913.

THERMOSTAT VALVE CONTROL.—Railway Utility Company, 226 South La Salle Street, Chicago, Ill.

"Utility Thermostat Control," consisting of a solenoid-operated valve to be operated on a 110-volt direct-current lighting circuit. The solenoid is controlled by a mercury and a low-voltage relay, the low voltage being obtained from taps on a shunt coil which protects the relay contacts.

This device is judged to be suitable for use when the wiring is installed in accordance with rules for Class C wiring of the National Electrical Code.

Approved July 12, 1913.

[By an inadvertence the following card was run among the cards of approval in our issue of July 12. This lamp lock has not yet been approved. —Editor.]

LAMP LOCK.—Rotating Electric Lamp Lock Company, 1525 North Rockwell Street, Chicago, Ill.

A socket extension provided with collar at the attachment-plug end for locking to the shade ring of the pocket and with a rotating shell in which a lamp may be locked.

Current Electrical News

LIGHTING AND POWER.

(Special Correspondence.)

PAYNESVILLE, MINN.—A "White Way" system is being discussed for this place. C.

PORTAGE, WIS.—Electric Light bonds were voted for the erection of a light plant here. C.

MT. MORRIS, MICH.—The Council plans to install a light and water system. Address the Mayor.

COMPTON, CAL.—Bids will be received until October 7 for a lighting franchise in this city.

WILSON, KANS.—Weber Electric Power Company has been incorporated with a capital stock of $7,000.

SHEBOYGAN FALLS, WIS.—This village is planning to construct and operate a municipal electric lighting plant.

MAQUOKETA, IOWA.—Plans are being agitated for the establishment of an electric light and power plant here.

SWANVILLE, MINN.—It is reported that Albert Mielke is negotiating with the Village Council for an electric light franchise.

RUNGE, TEX.—The Council is planning to install a $20,000 light and water system. Address the Mayor for further information.

HOLDENVILLE, OKLA.—The Holdenville Ice & Electric Company is planning to purchase transformers for its street lighting system.

PURCELL, MO.—A. M. Baird of Cartersville, Mo., and associates have secured a franchise and will construct an electric light system here.

MIDDLEBORO, TENN.—The Electric Power Company will build a power plant to furnish electricity to the coal mines and to build trolley lines.

HENNESSEY, OKLA.—The Hennessey Electric Light & Power & Ice Company is planning to install a 30 to 40-horsepower oil engine and generator.

LEBANON, KANS.—It is reported that at a recent election this place voted in favor of issuing municipal electric light bonds in the amount of $18,000.

HARRODSBURG, KY.—It is expected that this city will issue $10,000 in bonds for the purpose of putting the electric light plant in the best of condition. G.

POY SIPPI, WIS.—Poy Sippi Light & Power Company has been incorporated with a capital stock of $5,000 by Lyman Colt, Chester Colt and Floria E. Colt.

BUTTE, MONT.—The City Council has passed a resolution creating the district for ornamental street lighting. Write the city clerk for further information. C.

CAMPBELLSVILLE, KY.—I. H. Thurman and others have purchased an electric light franchise from this city and will begin construction work at once. G.

CAMBRIDGE, MD.—The Cambridge Gas, Electric Light & Power Company is planning to construct a transmission line 18 miles long and install additional equipment.

LINDSAY, CAL.—At the annual meeting of the Tulare County Power Company, it was decided to expend the sum of $200,000 in the improvement of the system. T.

LINTON, IND.—Plans and specifications have been prepared for the installation of additional cluster lamps in the business district. Address S. W. Fries, superintendent.

LAKELAND, KY.—The electric light and power plant of the central insane asylum here was burned September 4 with $12,000 loss. W. E. Gardner is superintendent.

KERENS, TEX.—Kerens Light & Power Company has been incorporated with a capital stock of $15,000 by S. E. Bergstron, H. R. Daniel, W. T. Stockton and others.

BERLIN, WIS.—The City Council is considering installing cluster lighting along the principal business street of the town. The estimated cost of this work is $2,400. C.

ELLSWORTH, MINN.—A resolution has been passed for the establishment of a public electric light, heating, and power plant in this village and $8,000 worth of bonds voted. C.

COSHOCTON, O.—The Coshocton Light & Heating Company plans to install additional equipment and to erect about 15 miles of transmission line. Address C. H. Howell, manager.

MOUNT VERNON, CAL.—It has been announced that the Stone & Webster Company plans to extend its service over a share of the big farming territory lying north and west of here.

JEFFERSONVILLE, IND.—The bid of Owen L. Carr, Rushville, Ind., to furnish street lighting service for this city has been accepted and contract for a plant will be awarded shortly. G.

TULLAHOMA, TENN.—The Tennessee Utilities Company has been incorporated with a capital stock of $25,000. It plans to build a hydroelectric plant on Elk River to develop 20,000 horsepower.

VISALIA, CAL.—The Pacific Light & Power Company has won all of its suits for rights of way for the high-voltage steel-tower system across the country between this city and Los Angeles. T.

PASADENA, CAL.—The residents of Bellview and Waverly Streets have petitioned the city officials to install ornamental lighting along their streets. It is the intention of the property owners to put in bronze posts of the very latest design. T.

SPRINGFIELD, ORE.—A power line of the Oregon Power Company will be extended from the plant here to Albany, in order to supply energy which was recently contracted for by the Portland, Eugene & Eastern Railway. O.

ELMO, MO.—Residents of this town have asked the County Court to grant permission for poles and wires to be strung from Clarinda, Iowa, by the Lee Electric Company. The franchise, if granted, will be a 20-year one.

FAIRMONT, N. C.—Fairmont Light & Power Company has been incorporated with a capital stock of $50,000. The incorporators are A. L. Jones, E. V. McDaniel, J P. Brown, L. E. Ricks, N. A. Andrews, E. G. Floyd and O. I. Floyd.

ELMIRA, N. Y.—Elmira Transmission Corporation has been incorporated with a capital stock of $10,000, to engage in the electrical-power industry. The incorporators are F. G. Robinson, Henry Morgan, G. H. Olney, all of New York City.

HOPKINSVILLE, KY.—The Kentucky Public Service Company is reported to be planning an enlargement of its power plant here with the idea of extending service to Cerulean, Pembroke and other points within a radius of 10 miles. G.

MANHATTAN BEACH, CAL.—The officials of this city have decided to construct a system of electroliers of an ornamental nature along the Ocean front from the northern to the southern boundary of the city, this work to cost something like $25,000. T.

SALT LAKE CITY, UTAH.—The Utah Light & Power Company plans the construction of a transmission line, with a current capacity of 110,000 volts, from an installation at Grace, Idaho, into Ogden and Salt Lake. The proposed line will cost about $1,000,000.

GRANDFIELD, OKLA.—At an election the Town Council of Grandfield awarded an electric lighting franchise to Brabham and Edwards. Work of wiring the business section of the town has been started and it is expected that the plant will start with 500 lamps.

INTERNATIONAL FALLS, MINN.—Plans are being laid to obtain a municipal lighting and power plant for this city. It is planned to conduct a water plant in conjunction with the power plant, and bids will also be asked for pumping machinery. Address Mayor Kane for desired information.

WINDSOR LOCKS, CONN.—Merchants here have subscribed $1,200 to pay for installing ornamental street lighting apparatus on the main street of the town. It is expected that the town will supply the current to light the new lamps and the plan is to extend the improved lighting to other streets eventually. W.

MAYVILLE, N. D.—At a special election it was decided to issue $9,280 in bonds for the erection of a power house and to supply boilers, engines, dynamos and other needed equipment

for an electric light and water works system. George O. Stomner is mayor of the town and C. O. Vangen, auditor.

GRAND JUNCTION, COLO.—This city is to have a municipal hydroelectric plant for the development of light and power for the use of its citizens, for its public utilities and for the municipality. A preliminary permit for a conduit on the Battlement National Forest has just been granted by the Secretary of Agriculture.

EPHRATA, WASH.—William F. Scheffel and Thomas J. Smith have applied to the City Council for a light and power franchise in this city. They have secured an option on water rights in the Beesley Canyon and purpose building a power and light plant, also an irrigation plant. In all probability the franchise will be granted. O.

LOS ANGELES, CAL.—The Globe Milling Company, of this city, has just acquired the vessel known as the *Portland* and is making elaborate improvements amounting to $40,000, these to include the installation of an electric power plant, four electric elevators which will be used for the unloading of the grain. T.

HARRISBURG, PA. — The State Water Supply Commission has approved the merger of the North Towanda, Wysox, Ulster Borough, Towanda asylum and Sheshequin water power companies, chartered for Northern counties, into the Bradford Power Company; and the application for a charter of the Whitaker Water Company to supply Whitaker Borough, Allegheny County.

ANNISTON, ALA.—Between $125,000 and $200,000 will be spent in Anniston by the Alabama Power Company in the construction of a substation. Included in the equipment will be three of the largest transformers ever brought to this section of the South. They will receive electric energy from the Jackson Shoals plant, south of here; from the Gadsden steam plant and from Lock 12, reducing the current from 110,000 to 22,000 volts.

LEBANON, KY.—A municipal electric light plant, to be operated in connection with a municipal telephone system, is the novel project which has been put on foot here. The Lebanon Home Telephone Company is declared by business men to be serving the town inadequately, and the municipal plant has been proposed seriously as a relief. A bond issue of $50,000 is being considered as a means of financing the improvements. A committee of business men is investigating the feasibility of the idea. G.

MOSCOW, IDAHO.—The Washington Water Power Company, of Spokane, operating in this section of the country also, announces a reduction in the minimum charge on the monthly light rate in the residence district of 20 per cent and extensive improvements in this vicinity involving the expenditure of thousands of dollars, including extensions of lines to serve Troy, Kendrick, Juliaetta, Genessee, and other sections for the benefit of its power lines; and most important of all, the inauguration of a plan for extending its power and light into the rural farming district, with a view to furnishing such light and power to the farmers at a low cost. M. C. Osborne, of Spokane, is the commercial agent for the company above named. O.

FRANKFORT, MICH.—The Benzie County Power Company, of Frankfort, is building a water-power plant on the Betsie River, near Beulah, Mich. The plant has a hydraulic head of about 26 feet. When finished within the next few months hydroelectric power will be transmitted to Frankfort and the local plant will be shut down. Power will also be transmitted to Thompsonville, Honor and many other towns in Benzie and adjoining counties. Two other water powers are to be developed in the near future at sites higher up on the Betsie River; the aggregate of the three hydroelectric plants, which are to be operated together, will be about 5,000 horsepower. As the other two projected plants are completed, high-tension transmission lines are to be built southeast to Cadillac, and southwest to Manistee, supplying also intervening towns. Col. Eugene Zimmerman, of Frankfort, is president of the company, and Stanley B. Wiggins is chief engineer.

TELEPHONE AND TELEGRAPH.

(Special Correspondence.)

HUNTINGTON, L. I.—The New York Telephone Company has purchased a site for a central office in the north side of Suffolk County.

HARLAN, KY.—Mine operators here are planning the construction of an independent telephone system to connect Harlan, Middlesboro and Pineville.

MT. VERNON, KY.—Mt. Vernon Telephone Company has been incorporated with a capital stock of $1,000 by James Maret, Wade H. Graves and J. F. Dees.

STUART, VA.—The Farmers' Telephone Company has been incorporated with a capital stock of $4,868. H. L. Wimbush is president, and will operate the telephone system in Patrick, Floyd and Henry Counties.

BETHANY, ILL.—The Bethany Mutual Telephone Company has been incorporated with a capital stock of $8,000 to conduct a general telephone business. The incorporators are George McLaughlin, M. E. Scowse and others.

ST. HELENA, NEB.—John Halle, of this city, is organizing a telephone company to build a new line. The line as proposed will be about 1,500 miles in length and will cross the river at Yankton and connect with nearby towns.

SPRINGDALE, MONT.—The Duck Creek Telephone Company recently filed articles of incorporation with a capitalization of $1,000. W. D. McKenzie, A. M. Clark and William Muir, Jr., of Springdale, are the incorporators. Construction work will be ordered at once.

ATKIN, MINN.—The Palisade Rural Telephone Company has been organized with a capital stock of $5,000. The company will operate a local telephone in Palisade and connect with the Deerwood-Aitkin Telephone Company. J. O. Werntz is president of the company, W. J. Weber, vice-president; H. E. Mayer, secretary and treasurer.

INDIANAPOLIS, IND.—The Pike County Telephone Company has petitioned the Public Service Commission for authority to issue $70,000 worth of six-per-cent. 20-year bonds and $50,000 worth of stock. The money derived is to be used in extending the company's lines and for general improvement. The stock issue is a part of a proposed issue of $150,000. Edwin K. Spencer, of Evansville, is president of the company.

ELECTRIC RAILWAYS.

(Special Correspondence.)

NEWELL, W. VA.—The Newell Bridge & Street Railway Company has been incorporated with a capital stock of $500,000, to construct an electric railway and bridge across the Ohio River.

FORT RILEY, KANS.—It is reported that work on the interurban line between Eureka Lake and Fort Riley will be started again in the near future and that the line will be completed this fall.

GREENVILLE, TEX.—Steps have been taken here looking to the construction of an extension of the Anna & Blue Ridge Interurban Railway from Blue Ridge to Greenville. The line is already built between Anna and Blue Ridge. D.

WAUPACA, WIS.—The Milwaukee Western Electric Railway Company will build a line from Milwaukee through Juneau, Beaver Dam, Fox Lake, Markesan to Green Lake. From that point the Company proposes to build west to Stevens Point and Merrill. C.

OSHKOSH, WIS.—The Wisconsin Electric Railway Company is attempting to secure a new right of way between Oshkosh and Neenah, new route to lie near Lake Shore Road, and to touch at village of Winnebago, where the Northern Hospital for the Insane is located. J. P. Pulliam is manager of the Electric and Eastern Wisconsin roads.

RED LODGE, MONT.—Plans are being discussed for connecting this city with the Washoe and Bear Creek coal fields by trolley. The estimated cost of the line is $50,000. T. F. Pollard, William Larkin, Walter Alderson, A. H. Davies, F. A. Sell compose the committee which has charge of this proposition. C.

SAN FRANCISCO, CAL.—Permission has just been granted by the Railroad Commission of California to the Fresno, Hanford & Summit Lake Interurban Railway Company to issue bonds to the amount of $358,000, the proceeds to be applied to the construction of the first unit of the road between Fresno and Selma. T.

CORUNNA, MICH.—Corunna citizens have granted to the Michigan United Traction Company a franchise to operate in this city. As a result work will be started immediately on rebuilding the road in Corunna and between Owosso and Corunna.

OXNARD, CAL.—A large London syndicate has a representative who has been interviewing the people of the Simi Valley and Santa Paula section relative to building an electric line through the county and up the Coast to open up the mines in the eastern section of the county. It is very likely that a railroad of this nature will be erected. T.

DENTON, TEX.—The City Council has granted a charter to E. P. Turner and associates for an interurban route through Denton. According to the terms of the contract work is to be started within 18 months and the Dallas-Denton line is to be in operation within 18 months thereafter. Mr. Turner has stated that the ultimate purpose is to continue this line as far as Wichita Falls.

VISALIA, CAL.—The announcement that Los Angeles capitalists will soon start on the preliminary work of the electric line between this city and

the San Joaquin Valley has brought out another announcement that the Big Four Electric Railway Company has plans under way to extend that system at Visalia south from the Porterville terminus to meet the road from Los Angeles, which will end at M'Kitterick. The distance between Porterville and M'Kitterick is approximately 75 miles. T.

PORTLAND, ORE.—The Sandy Commercial Club, representing citizens living in the Sandy Road district, have inaugurated a campaign which has for its object the extension of the Portland Railway, Light & Power Company's electric line to the Sandy district, a distance of seven miles. Residents of Sandy have subscribed $5,000 as a bonus to encourage the building of the Multonomah & Eastern Railway from Cottrell, and this sum, in all probability, will be turned over to the Portland Railway, Light & Power Company.

SAVANNAH, GA.—The extension of the Brinson Railway system from its present terminus will, it is understood from a reliable source, be carried to a logical conclusion by the present management. Through the medium of capital derived from a refunding mortgage in favor of the Equitable Trust Company of New York, covering a total issue of $5,000,000, the improvements on the system will be made very shortly, though it is officially announced that for the present only $2.562,500 will be issued, the remainder being secured as may be necessary at a later date.

MEXICO, MO.—Plans for extending the interurban line north to Santa Fe were outlined at a recent meeting of the stockholders of the Mexico Investment & Construction Company. Briefly stated, the plan is to raise $26,000 with which to build the extension and equip the road for heavy passenger and freight traffic. The company will assume the amount until the improvements and construction is completed when the $26,000 subscribed will become due and payable. The officers elected are Marshall Rust, president; J. A. Botts, vice-president; W. W. Botts, secretary-treasurer, and J. D. Bates, general superintendent.

NEW INCORPORATIONS.

ANN ARBOR, MICH.—Schu Electric House has been granted articles of incorporation to deal in electric fixtures. The capital stock is $1,000.

CHEHALIS, WASH.—Automatic Electrical Controller Company has been incorporated with a capitalization of $100,000. The incorporators are C. J. Harrison, S. A. Davis and others.

CHICAGO, ILL.—Potsche Storage Battery Company has been incorporated with a capital stock of $75,000 to deal in primary batteries, electric and auto supplies. The incorporators are J. N. Lucas, A. C. Coomer and A. L. Jacobs.

LOS ANGELES, CAL.—The Pacific Motor Coach company has just been incorporated with R. G. Munn, T. L. Drake, W. H. Bradick, J. L. Stone, A. B. Miner, L. D. Colings, and C O. Bacon as incorporators. The capital stock is $500,000. T.

PITTSBURGH, PA.—The Pittsburgh Electric Tool Company has been granted a state charter with a capital of $5,000. The concern will deal in electric appliances and machinery of all kinds. The incorporators are Max Harris, Henry S. Stewart and M. K. Garrett.

BROOKLYN, N. Y.—Frankfort Electric Contracting Company, incorporated, has been granted articles of incorporation with a capitalization of $1,000. The incorporators are Benjamin Frankfort, Brooklyn; Harry R. Singer, Brooklyn, and Louis Rayvid, New York City.

HARTFORD, CONN.—The certificate of incorporation of the Derby Electrical Engineering Company has been filed with the Secretary of the State. The capital stock will be $5,000 and the incorporators are Charles J. Dickgiesser, Clinton W. Gray and John T. Donnelly.

NEW YORK, N. Y.—The Holley Company, Incorporated, has been granted articles of incorporation to deal in electrical appliances. The capital stock is $25,000 and the incorporators are Frank S. Barnett, East Orange, N. J.; William V. Holley and Arthur E. Carpenter, of New York City.

MT. HOPE, W. VA.—Mt. Hope Electric Power & Water Company has been incorporated with a capital stock of $25,000 for the purpose of manufacturing power, heat and light. The incorporators are John Faulkner, Ben Hurvitz and T. L. Feazell, of Mt. Hope; John B. Hofmeier, of Parkersburg, and James Faulkner, of Macdonald.

PROPOSALS.

ELECTRIC-DRIVEN CARRIAGE.—Sealed proposals will be received at the office of the Public Printer, Government Printing Office, Washington, D. C., until September 15, for furnishing one electrically-driven carriage.

CABLE.—Sealed proposals will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until September 23, for furnishing 22,505 feet of solid rubber-insulated duplex cable, for delivery at the Navy Yard, Washington, D. C., as per Schedule 5,818.

ELECTRICAL EQUIPMENT.—The Board of Administration, Watertown, Ill., will receive proposals for the electrical equipment at the Watertown State Hospital. Plans and specifications are on file at the institution, where all information may be obtained. Address communications to F. D. Whipp, fiscal supervisor.

ELECTRICAL INSTRUMENTS AND EQUIPMENT.—Sealed proposals will be received at the office of the Purchasing Officer, Isthmian Canal Commission, Washington, D. C., until October 6 for furnishing switchboard complete, with all electrical instruments and equipment. For further information address F. C. Boggs, major, Corps of Engineers, U. S. Army.

FIRE-ALARM SYSTEM.—Sealed proposals endorsed "Proposals for Remodeling Fire-Alarm System" will be received at the Bureau of Yards and Docks, Navy Department, Washington, D. C., until October 4 for remodeling the fire-alarm system at the Navy Yard, New York, N. Y. Specifications may be obtained upon application to the Bureau or to the commandant of the Navy Yard.

ELECTRIC CLUSTER LAMPS.—Bids will be received until September 15 for 20 electric cluster-lamp standards and the necessary work and material to install same, said standards to consist of a cluster of five lamps, four of which shall be 40-watt lamps, and the top lamp to be 60 watts, according to plans and specifications now on file with the village recorder. Address John M. Olson, president of Village Council, Bird Island, Minn.

WIRING AND LIGHTING.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until September 17, for furnishing conduit and wiring, lighting fixtures, etc., in the post office at Galesburg, Ill., and until September 24 for a conduit and wiring system and lighting fixtures in the post office at Huntsville, Ala., in accordance with drawings and specifications, copies of which may be obtained from the office of the custodian of the sites or from the Supervising Architect.

ELECTRIC CONDUIT AND WIRING AND INTERIOR LIGHTING FIXTURES.—Sealed proposals will be received at the office of the Supervising Architect, Washington, D. C., until October 8 for furnishing the electric conduit and wiring and interior lighting fixtures of a one-story building for the post office at Covington, Va.; and until October 9 of a two-story building for the post office at Plymouth, Mass., in accordance with drawings and specifications, copies of which may be obtained from the custodians of the sites or the office of the Supervising Architect.

DIRECT-CURRENT LIGHTING SYSTEM.—Contract will be let on September 16 for a direct-current lighting system consisting of pole line and wiring, oil engine and generator, building with future installation of battery system, for Lake Park, Minn., the estimated cost of which is $10,000. A certified check for $150 must accompany bids for each portion thereof. Plans and specifications may be seen at the office of the Village Recorder, Lake Park, Minn., or at the office of the consulting engineers, Oscar Claussen Engineering Company, St. Paul, Minn. Duplicate sets of plans may be had from the engineers for $4.00 each.

FINANCIAL NOTES.

In last week's issue there were given the expression of opinions concerning business conditions in the electrical industry, during the past six months, and the outlook for the immediate future, from many leaders in the industry. In this connection the report respecting the position of the Western Electric Company, by Vice-president Halligan is of interest. The business of the Western Electric Company for 1913 bids fair to equal $80,000,000, which was the estimate of the annual sales made at the first of the year. For the past seven months the sales have shown substantial increases in all sections of the United States, particularly in the East and Middle West. There have been fairly uniform increases in the sales of the many staple lines of electrical material distributed by the company, while the increases in the sales of such specialties as household devices, power and lighting equipments, and private telephone installations have been unusual. As a rule our customers are carrying smaller stocks of material than formerly, but the merchandise which they have carried has been turned over more rapidly and this has been reflected in the accounts with customers being paid more promptly. In fact, the collections of accounts from our customers have never been as prompt as they are today. Business outside of the United States shows a satisfactory rate of growth, and this business is feeling the impetus from the efforts to expand and broaden this side of the company's activities. The orders on hand, both domestic and foreign, at Au-

gust 1st were substantially more than at January 1st, which leads us to expect a season of good business during the coming fall.

Ottawa, Ont., has sold $1,000,000 4.5-per-cent bonds, issued mainly for waterworks, electric lighting and local improvements, to G. A. Stimson & Company, Toronto.

Pacific Telephone & Telegraph Company has called for payment on October 1 at 105 at the Old Colony Trust Company, Boston, all outstanding ($2,250,000) five-per-cent consolidated gold bonds of the Sunset Telephone & Telegraph Company dated October 2, 1899.

Gross operating revenue of the Interborough Rapid Transit Company for July amounted to $2,341,027, an increase of $74,418 over the same month last year. The net income for the month was $243,705, a gain of $92,428. During July 45,558,948 passengers were carried, compared with 44,056,991 the previous year.

Stockholders of the Appalachian Power Company will meet September 8 to authorize the creation of a second mortgage on the property of the company to secure $3,000,000 second mortgage six-per-cent bonds, dated September 2, 1913, and maturing September 2, 1933. These bonds, with $550,000 five-per-cent first-mortgage bonds of the company, now in its treasury, will be deposited as collateral for an authorized issue of $3,000,000 five-year-seven-per-cent collateral notes.

The Electric Company of America will hold a special meeting on October 7 for the purpose of submitting to stockholders a resolution adopted by the directors, calling for the dissolution of the company. A two-thirds vote will be required to make the proposal effective. If the resolution is ratified the outstanding stock will receive 140 per cent in American Gas & Electric 5s and a distribution from the money now in the treasury, remaining after the expenses of dissolution are met, equivalent to approximately 2.5 per cent.

A proposition to increase the capitalization of the Massachusetts Lighting Companies from $5,000,000 to $10,000,000 will be submitted to stockholders by the trustees at the annual meeting, which will be held in October. The new capital will be divided equally into common and preferred stock. It is proposed to exchange for the old stock one share of the new preferred and one share of the new common. At present there is only one kind of stock. Trustees state that the enlarged capitalization will more nearly represent the cash paid in and the actual value of the assets of the association.

In connection with the filing of a $20,000,000 mortgage by the Alabama Power Company in favor of the Montreal Trust Company, Thomas W. Martin, general counsel for the power company, issued the following statement: "Several days ago we filed with the Secretary of State a joint agreement between Alabama Power Company, Alabama Electric Company, Wetumpka Power Company, Alabama Power & Electric Company and Alabama Power Development Company, prescribing the terms of the merger of the four last named companies into the Alabama Power Company. The joint agreement authorizes the Alabama Power Company to issue bonds to the extent of $20,000,000, secured by a mortgage on its properties. A large amount of money has been secured by this and the other companies in the merger through the same financial interest, and part of the funds thus obtained will be secured by the bonds under this mortgage, as usual with such developments."

The Standard Gas & Electric Company has declared the regular two-per-cent quarterly dividend on its preferred stock in scrip instead of in cash. The scrip is negotiable, maturing in 1923, bearing six-per-cent interest, payable quarterly, and will be distributed September 15. H. M. Byllesby & Company managers of the company, say that the continuance of the cash dividend is impracticable, as the taxes of subsidiary companies in the past two years have been increased over $200,000, or approximately two-per cent on the preferred stock of the Standard Gas & Electric. The depression in the security market rendered it necessary for the company to sell $2,650,000 six-per-cent collateral-trust notes to finance its needs, and $500,000 of these notes must be paid June 1, 1914. The discontinuance of the cash dividend is expected to enable the company to meet this maturity out of its income, to pay other charges and to extend financial assistance to subsidiaries.

Dividends.

Brazilian Traction, Lighting and Power Company, quarterly of 1.5 per cent on preferred, payable October 1 to stock of record September 15.

Chicago Telephone Company; the regular quarterly dividend of $2 per share on its capital stock, payable September 30 to stock of record September 29.

Chippewa Valley Railway, Light & Power Company; a quarterly preferred dividend of 1.75 per cent, payable September 1.

Consumers' Power Company; regular quarterly of 1.5 per cent on the preferred stock, payable October 1 to stock of record September 19.

Eastern Power and Light Company; quarterly of 1.5 per cent on preferred, payable September 15 to stock of record August 30.

Tonda, Johnstown & Gloversville Railroad: a quarterly preferred dividend of 1.5 per cent, payable September 15.

Galveston-Houston Electric Company; a semi-annual dividend of $3 a share on the common stock, an increase of $1 per annum. The regular semi-annual dividend of $3 per share on the preferred stock was also declared.

Lake Shore Electric Railway Company; a quarterly first-preferred dividend of 1.75 per cent, payable October 1.

Manila Electric Railroad & Light Corporation, quarterly of 1.75 per cent, payable October 1 to stock of record September 18.

Manhattan Street Railway Company; the regular quarterly dividend of 1.75 per cent, payable October 1.

United Traction & Electric Company; quarterly of 1.25 per cent, payable October 1 to stock of record September 9.

Reports of Earnings.

GALVESTON-HOUSTON ELECTRIC COMPANY.

The earnings of the Galveston-Houston Electric Company continue at a satisfactory rate. Good increases are shown in both gross and net for the month of July and the twelve months ended with July. The comparative report of the company is as follows:

Month of July—	1913.	1912.
Gross earnings	$ 228,910	180,558
Net earnings	107,763	80,002
Surplus over charges	72 299	46,501
August 1—July 31—		
Gross earnings	2,265,182	1,778,397
Net earnings	970,636	700,474
Surplus over charges	559,082	367,791

UNITED LIGHT & RAILWAYS.

United Light & Railways Company for July, 1913, an the twelve months ended July 31, 1913, reports consolidated earnings of subsidiary companies as follows:

	1913	1912
July gross	$ 499.581	$ 438,634
Net after taxes	197,513	186,441
Surplus after charges.	95,938	95,479
12 months' gross	5,759,876	5,082,882
Net after taxes	2,372,345	2,054,656
Surplus after charges.	1,207,611	943,583

GREAT WESTERN POWER.

The Great Western Power Company reports earnings for July, 1913, and the seven months ended July 31, 1913, as follows:

	July.	Seven Months.
Gross	$222,348	$1,540,253
Net after taxes	145,664	1,037,213
Surplus after charges.	65,451	473,841

Surplus after charges for July, 1913, compares with $20,646 for July, 1912, and surplus for the seven months compares with a surplus of $272,462 for the seven months of 1912.

BOSTON ELEVATED.

The Boston Elevated Company has issued its annual report for the year June 10, 1913. The income account compares as follows:

	1913	1912
Total operating rev.	$16,808,908	$15,904,046
Operating expenses	11,135,581	10,976,634
Net operating rev.	5,673,327	4,927,412
Other income	159,419	618,495
Total net	5,832,747	5,545,907
Charges and dep.	5,132,124	4,840,539
Balance	700,622	705,368
Dividends	1,197,000	1,197,000
Deficit	496,377	401,631

EL PASO ELECTRIC COMPANY.

Earnings of the El Paso Electric Company continue to show good increases. The comparative report of the company for the month of July and the twelve months ended July 31 is as follows:

Month of July—	1913.	1912.
Gross earnings	$ 65,551	$ 59,620
Net earnings	29,581	23,293
Surplus over charges	27,070	17,416
Twelve months ended July 31—		
Gross earnings	$865,666	$737,955
Net earnings	399,938	325,600
Surplus over charges	357,646	244,333

CLOSING BID PRICES FOR ELECTRICAL SECURITIES ON THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Sept. 8	Sept. 1
American Tel. & Tel. (New York)	130⅞	130¼
Commonwealth Edison (Chicago)	148	147½
Edison Electric Illuminating (Boston)	240	272
Electric Storage Battery common (Philadelphia)	47¾	47
Electric Storage Battery preferred (Philadelphia)	47¾	47
General Electric (New York)	144	146
Kings County Electric (New York)	119	117½
Manhattan Transit (New York)	1½	1⅝
Massachusetts Electric common (Boston)	14	14
Massachusetts Electric preferred stamped (Boston)	71	71½
National Carbon common (Chicago)	118	116
National Carbon preferred (Chicago)	113	113
New England Telephone (Boston)	145	145
Philadelphia Electric (Philadelphia)	23	22¼
Postal Telegraph and Cables common (New York)	83	84
Postal Telegraph and Cables preferred (New York)	66	66¼
Western Union (New York)	67½	69
Westinghouse common (New York)	72⅛	73½
Westinghouse preferred (New York)	114	114

PERSONAL MENTION.

MR. W. W. VAN AUSDALL has been appointed sales engineer in charge of the special reversing planer motor department of the Triumph Electric Company, Cincinnati, O.

MR. T. E. JEWELL has been appointed manager of the New England office of the C. & C. Electric & Manufacturing Company, Garwood, N. J., with office at 120 Milk Street, Boston.

MR. HARLAN B. PEABODY, formerly supervisor of manual training in the schools of Wakefield, Mass., has been made instructor of applied electricity in the Technical High School, Providence, R. I.

PROF. MARTIN E. RICE, of the Electrical Engineering Department of the University of Kansas, was married on September 4 at Yankton, S. D., to Miss Hazel Hope MacGregor. Professor Rice and his bride are to reside at 808 Illinois Street, Lawrence, Kans.

MR. J. H. LARMONTH has been elected, September 3, permanent secretary of the Canadian Electrical Association. Mr. Larmonth is a consulting electrical engineer, with offices in Toronto, and he will handle the affairs of the Association from that city.

MR. S. B. JOHNSON is now connected with the Reynolds Electric Flasher Manufacturing Company as general traveling representative. MR. W. B. BLAIR, formerly with the Northern Display Advertising Company, of Minneapolis, has also joined the Reynolds organization.

MR. A. R. BONE, commercial superintendent of the Chicago Telephone Company, addressed the Chicago Advertising Club at its luncheon on Thursday, September 4. The subject of Mr. Bone's address was "Commercial Growth and Development of the Telephone Business in Chicago During the Past Few Decades."

MR. CARL KEITH, treasurer of the Illinois Electric Company, Chicago, has just returned from a two-months' vacation, spent at his summer home at Star Lake, Wis. He has gained in weight, but sad to relate has been shorn of his hirsute adornment, which has for years been the pride of that otherwise smooth-shaved organization.

MR. FRANK E. HEALY, president of the Illinois Electric Company, Chicago, was drenched with water while passing a prominent hotel in Chicago the other day. As he gazed upward in astonishment a young man walked up to him and said "You can never tell when the Heavens will give forth rain." Frank shook himself, relit his cigar, and remarked "Well, I'm glad they hung on to the bucket."

MR. W. McK. WHITE, a widely known automobile man, has been appointed sales manager of the Esterline Company. The company recently moved to Indianapolis, Ind., from Lafayette, in order to secure increased manufacturing facilities for producing its electric lighting systems for automobiles, motor boats, locomotives, harbors, street railways, etc., and for its other electrical specialties. Mr. White has been actively engaged and highly successful in sales promotion and publicity in the automobile field.

Mr. H. S. BLACK has been appointed manager of works of the Westinghouse Lamp Company, Bloomfield, N. J., to succeed MR. R. H. HENDERSON, who has resigned to engage in other work. Mr. Black has had considerable experience in the engineering and manufacturing department of the National Quality Lamp Division of the General Electric Company. For the last three years he has been directing the work of the St. Louis factory of this company in which he has been unusually successful.

MR. THOMAS A. EDISON took a cold while in Monhegan, Me., where he had been spending a week, and on September 3, with Charles L. Edgar, president of the Edison Electric Illuminating Company of Boston, and Mrs. Edgar, motored to Boston. The following day Mr. Edison, accompanied by his wife, son and daughter, continued his trip to Sunapee, N. H., where all were the guests of Richard Colgate, of New York. Report was that Mr. Edison had regained his normal health and planned to return to his home in New Jersey early in the present week.

MR. H. L. BLEECKER, second vice-president of the Washington Water Power Company, Spokane, Wash., who was elected president of the Northwest Electric Light and Power Association

H. L. Bleecker.

at its recent convention, was born in Belleville, Ont., August 31, 1873, of American parents. Early in his youth he removed to Los Angeles, California, where he received his education in the public schools of that city. At the age of 19 years he entered the legal department of the old Los Angeles Cable Railway Company. He was admitted to the bar of California when but 21 years of age. In the year 1900 he moved to Spokane, Wash., and became connected with the Washington Water Power Company, of that city. He first entered the services of the company as clerk to the general manager, later being promoted to the position of assistant secretary, then to secretary and again to the position of second vice-president.

OBITUARY.

MR. J. C. EICHMEYER, one of the best known electrical inventors in New York state, died on August 31 at the age of 54 years. Mr. Eichmeyer installed most of the fire-alarm and police-signal systems in the state of New York outside of New York City, and was the inventor of many appliances used with these systems. He also invented and installed in Schenectady the first police flash system of the selective type.

NEW PUBLICATIONS.

SAFETY LAMPS.—The Bureau of Mines, Washington, D. C., has issued Miners' Circular 12 entitled "The use and Care of Miners' Safety Lamps," by James W. Paul. This gives an illustrated description of the lamps and the precautions to be taken in using them.

KEOKUK DEVELOPMENT.—The Mississippi River Power Company has issued its final bulletin, No. 10, describing the completion of the construction work upon the dam, power plant and locks on the Mississippi River at Keokuk, Iowa. A general review of the work is given in this bulletin with illustrations of the different stages of development, and these illustrations are colored. July 1 was the date set for completion, and by that time the dam was finished and ten of the generating units were ready to supply 10,000 horsepower each. Power is now being supplied to Keokuk, St. Louis, Hannibal, Quincy, Alton, Fort Madison and Burlington. Fifteen generating units have been installed and space has been provided for 15 additional units, which can be installed when required. On August 25-28 the celebration of the opening of the power house was held, exercises being held at both the Illinois and Iowa ends of the dam, participated in by the governors of the two states.

FOREIGN TRADE OPPORTUNITY.

(Where addresses are omitted they may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D. C. In applying for addresses refer to file number.)

NO. 11,593. ELECTRIC PUSH-BUTTON CASES.—A report from an American consular officer states that a business man in his district desires to be placed in communication with American manufacturers of electric push-button cases. The inquirer understands that these cases are made in the United States of a special paper cardboard. He desires samples, prices, discounts, and terms of payment on 100,000 of these cases, for which number he is prepared to place an order. Correspondence should be in Italian.

DATES AHEAD.

International Brotherhood of Electrical Workers. International meeting, Boston, Mass., September 15.

Pennsylvania Section, National Electric Light Association. Annual convention. Delaware Water Gap, Pa., September 16-18.

National Association of Corporation Schools. First annual convention, Dayton, O., September 16-19.

New England Section, National Electric Light Association. Annual convention, Hotel Vermont, Burlington, Vt., September 17-19.

Illuminating Engineering Society. Annual convention, Pittsburgh, Pa., September 22-26.

Association of Iron and Steel Electrical Engineers. Annual meeting, New York, N. Y., September 22-27.

Indiana Electric Light Association. Annual convention, Indianapolis, Ind. September 24-25.

Colorado Electrical and Industrial Exposition, Auditorium, Denver, Colo., October 4-11.

Colorado Electric Light, Power and Railway Association. Eleventh annual convention, Denver, Colo., October 6.

Kansas Gas, Water, Electric Light and Street Railway Association. An-

nual convention, Hutchinson, Kans., October 9-11.

American Electric Railway Association. Annual convention, Atlantic City, N. J., October 13-17.

Jovian Order. Annual convention, Hotel Astor, New York, N. Y., October 14-16.

Railway Signal Association. Annual convention, Nashville, Tenn., October 14-17.

Telephone Pioneers of America. Annual meeting, Chicago, Ill., October 16-17.

Electrical Exposition and Motor Show of 1913. New Grand Central Palace, New York, N. Y., October 15-25.

American Mining Congress. First national mining show, Horticultural Hall, Philadelphia, Pa., October 17-25.

Association of Railway Electrical Engineers. Annual convention, Hotel La Salle, Chicago, Ill. October 20-24.

Electric Vehicle Association of America. Annual convention, Hotel La Salle, Chicago, Ill., October 27-28.

With the Electrical Manufacturers

Joseph Dixon Crucible Company, Jersey City, N. J., has included in the September number of its monthly house organ "Graphite," a valuable set of suggestions prepared by Prof. A. F. Ganz covering the use of graphite brushes for commutators.

The Borden Company, Warren, O., has issued a new catalog of its high-grade tools for cutting and threading pipe; 24 pages are devoted to descriptions with illustrations and complete data of the various types of die stocks and cutters made by the company.

Smith & Hemenway Company, 150 Chambers Street, New York City, which owns the "Red Devil" tool factory, has just issued a new neatly illustrated booklet giving net prices of 3,000 Red Devil tools. The company will be pleased to mail a copy on request to anyone interested.

Sundh Electric Company, New York City, has issued a large number of new loose-leaf pages for its catalog. Included among these are numerous price lists and also descriptive pages covering automatic self-starters for direct current and also alternating current, solenoid-operated brakes, contractors, elevator controllers, panels, etc.

Arthur S. Partridge, New Bank of Commerce Building, St. Louis, Mo., has issued his forty-third monthly list of used electrical and steam machinery. Included in this is a large assortment of single, two and three-phase generators, turbo units, motors of various kinds, direct-current machines, motor-generators, boosters, transformers, simple and compound steam engines, gas engines, boilers, etc.

Kuhlman Electric Company, Elkhart, Ind., announces that it is proud of the fact that the last order booked in August, for a 300-kilowatt three-phase transformer, was received from the same gentleman who favored the company with its first order on October 15, 1903. This customer has ordered from the Kuhlman Company in the past ten years transformers aggregating over 2,000 kilowatts.

The Standard Electric Tool Company, Cincinnati, O., has issued two new bulletins, Nos. D9 and DA10, respectively. These supersede former publications dealing with Standard high-power direct-current and two-phase and three-phase alternating-current portable drills. These bulletins include illustrations and descriptive matter in relation to the various types of drills and also full data regarding them.

Asbestos Protected Metal Company, Beaver Falls, Pa., has issued Bulletin 53. This deals with Asbestosteel for roofs and walls. The bulletin is well illustrated, not only with detailed views showing this material and its method of installation, but also with many views of typical installations of various kinds in which this material is used either for roofing or siding of industrial, railroad, power plant, and other structures.

Tabulating Machine Company, 25 Broad Street, New York, N. Y., has issued a booklet entitled "A Business Compass." This describes the uses of the Hollerith punched-card system for making rapid and comprehensive sales analyses. This system is adaptable to a great variety of business concerns, manufacturing, mercantile, transportation, etc., and has been highly recommended for the analyses of daily, weekly, or monthly operations.

B. J. Carney & Company, of Grinnell, Ia., producers of western cedar poles have opened an office in the Westman Chambers, Regina, Sask., Canada, in charge of G. V. Bacon. The company has also recently opened an office in the Scollard Building, Dallas, Texas, which is in charge of P. A. Pitchard, formerly purchasing agent for the Stone & Webster Engineering Corporation at Dallas. The company has 20 concentrating yards in the Spokane country. It has an excellent stock of poles and can give prompt service.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., reports the receipt of a considerable number of orders recently for textile motor equipment. Among these orders are the following: Rosemary Manufacturing Company, Roanoke Rapids, N. C.; electric drive is used throughout this plant and on the additional 300 looms individual drive will be employed, whereas on the spinning frame a total of 16 four-frame drive motors will be used, these motors being of 20 and 25 horsepower capacity; individual drive will also be used on the pickers, the motors being placed on the "A" frame; in addition to the above, there are to be used about 300 horsepower in motors for line-shaft drive. Improvements at the plant of the W. E. Hooper & Sons Company, Baltimore, Md., are practically completed and electric drive has been employed throughout. Power is being purchased from the Consolidated Electric Light Heat & Power Company and the electrical installation is said to be one of the finest in Baltimore and vicinity; 150 motors, totalling 2,000 horsepower are being used. At the Cedar Cliffs Silk Mills, Chambersburg, Pa., individual drive is being used on all of the looms. The Postex Cotton Mills has put in operation its bleaching plant and, as in the rest of the mill, electric drive has been employed. The Penn Tapestry Company, at Glen Riddle, Pa., has changed over to electric drive and installed a generator and a number of small motors. The Stroock Plush Company, Newberg, N. Y., has added a 400-kilowatt engine-type generator to its power equipment, as well as 350 horsepower in motors, including motors for individual drive on the plush looms. The Pine Tree Silk Company, Philadelphia, Pa., has installed 17 additional silk looms, and individual motor drive is being used.

General Electric Company, Schenectady, N. Y., reports that among the many recent orders were the following: New Castle Portland Cement Company, New Castle, Pa., a 1,000-kilowatt Curtis turbogenerator with 50-kilowatt motor-generator exciter set, switchboard and accessories. Delaware, Lackawanna & Western Railroad Company for its shops at Scranton, Pa., two 300-kilowatt rotary converters, a 150-kilowatt synchronous motor with exciter, 24 transformers ranging from 50 to 750 kilovolt-amperes, and 82 motors for electric drive ranging from 7.5 to 75 horsepower. Pennsylvania Rubber Company, Jeanette, Pa., a 500-kilowatt Curtis turbogenerator, one 300-horsepower motor, four motors of 40 and 75 horsepower, control panels, switchboard and accessories. United States Aluminum Company, New Kensington, Pa., four 15-horsepower, four 25-horsepower and one 100-horsepower motors. H. U. L. Chase Bag Company, St. Louis, Mo., 11 motors ranging from 3 to 20 horsepower. Dexter Portland Cement Company, Nazareth, Pa., one 250-horsepower and two 200-horsepower motors and panels. Tidewater Portland Cement Company, Union Bridge, Md., three 15-horsepower, two 25-horsepower and two 100-horsepower induction motors. Standard Oil Company, for its plant at Constable Hook, N. J., a 240-kilowatt alternating-current generator with exciter, two 100-horsepower induction

motors and control panels. The Collins Company Co., Collinsville, Conn., three 200-kilowatt transformers, 11 motors ranging from 5 to 100 horsepower and switchboard panels. Great Western Portland Cement Company, Hildred, Kans., two 200-horsepower induction motors. New Haven Clock Company, New Haven, Conn., 25 motors ranging from 1 to 75 horsepower with compensators and accessories. Riverside Portland Cement Company, Riverside, Cal., a 750-kilowatt water-cooled transformer. Snider Manufacturing Company, Logan, O., a 200-kilowatt alternating-current generator with exciter, 19 motors ranging from 1 to 20 horsepower, and switchboard.

Record of Electrical Patents.

Issued by the United States Patent Office, September 2, 1913.

1,071,710. Lighting-Arrester. E. E. F. Creighton, assignor to General Electric Co. A number of multigap units are provided with antennae on opposite sides thereof to influence their breakdown potential.

1,071,725. Adjustable Mirror and Light. W. L. Franks, Rock Island, Ill., assignor of one-third to E. Peters. The mirror is adjustable and the electric lamp is circularly adjustable about the mirror.

1,071,737. Switch. G. W. Hart, assignor to Hart Mfg. Co., Hartford, Conn. Has a switch-closing solenoid and a detent-releasing solenoid.

1,071,759. Valve. F. F. Landis, Waynesboro, Pa. Includes an electromagnetically operated auxiliary valve.

1,071,769. Circuit-Controller. H. McCready, assignor to Union Switch & Signal Co., Swissvale, Pa. A signaling-circuit relay includes a fusible contact.

1,071,770. Motor-Control System. R. H. McLain, assignor to General Electric Co. A separately excited motor is fed from a special generator which has a separately excited shunt field and a normally short-circuited self-excited differential series field.

1,071,778. System of Motor Control. W. Naumann, assignor to General Electric Co. Includes special reversing control for a hoisting motor.

1,071,780. Typewriting Machine. W. J. Neidig and C. B. Stewart, assignors to Neidig Typewriter Co., Chicago, Ill. Includes a number of paper-feelers and individually distinguishable indicating devices, each separately electrically controlled by a paper-feeler.

1,071,781. Engine and Magneto Assembly. E. A. Nelson, assignor to Hupp Motor Car Co., Detroit, Mich. The magneto is mounted on the flywheel housing.

1,071,807. Electrical Interlocking Mechanism. J. L. Schureman, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. The electrically operated main switch is prevented from closing as long as any resistance switch is closed.

1,071,819. Combined Typewriter and Telegraph-Transmitter. H. H. Steele, assignor to Remington Typewriter Co., Ilion, N. Y. Has means for selecting and arranging in operative position the necessary contacts to transmit the Morse equivalent of the printing.

1,071,830. Electric Pump-Governor. W. V. Turner, assignor to Westinghouse Air Brake Co., Pittsburgh, Pa. For an air compressor.

1,071,838. Magnetic Separator. J. Weatherby, assignor to Electric Ore Separator Co., New Cumberland, Pa. The ore is transferred by a rotor through the magnetic field between two pole pieces.

1,071,839. Ore Concentrator. J. Weatherby, assignor to Electric Ore Separator Co. A reciprocatory dressing table has riffles for preliminary separation of the ore and magnetic strips for final magnetic separation.

1,071,840. Motor Control. M. A. Whiting, assignor to General Electric Co. Has automatic accelerating means and means for rendering the same inoperative until the current reaches a predetermined value.

1,071,843. Resistance Grid. H. J. Wiegand, Milwaukee, Wis. Is provided with an insulating reinforcing member firmly secured in place.

1,071,844. Reinforced - Grid Resistance. H. J. Wiegand. A U-shaped reinforcing strip fits over the edge.

1,071,847. Magnetically Operated Conveying and Discharging Apparatus. W. G. Wilson, assignor to W. G. Wilson Co., Montclair, N. J. Consists of a rotary magnet wheel with radial coils and poles, outside which is an annular chamber in which moves an endless conveyor with soft-iron transverse disks.

1,071,851. Car Construction. D. Woodhead, assignor to Central Electric Co., Chicago, Ill. Provides for indirect illumination through a row of electric lamps and reflectors adjacent the deck sill, thus throwing light on a false ceiling. (See cut on next page.)

1,071,869. Continuous Foot-Cap. W. L. Bliss, assignor to United States Light & Heating Co., New York, N. Y. For a car-lighting generator.

1,071,871. Fuse Plug. R. G. Bronson, Chicago, Ill., assignor of one-half to W. J. Krueger. Edison plug with several fuse wires in different channels that may be used successively.

1,071,879. Skelp - Charging Bench. W. F. Clark, Coraopolis, Pa. Has electromagnets between the rollers for maintaining traction between the rollers and skelp.

1,071,884. Automatically Operated Electric Signals for Railways. W. J. Cook, assignor to Cook Railway Signaling Co., Denver, Colo. Electromagnetically controlled semaphore.

1,071,886. Electromagnetic Switch. A. S. Cubitt, assignor to General Electric Co. A relay with dashpot and switch contacts.

1,071,900. Illuminating Device. K. Edison, New York, N. Y., assignor of one-half to J. B. Moschenross. Includes a cluster of electric lamps in a horizontal lensed bulb and reflector which revolve about a horizontal axis and also bodily about a vertical axis.

1,071,905. Electromagnetic Device. M. F. Geer and R. C. Leake, assignors to General Railway Signal Co., Gates, N. Y. Special armature construction for a vibrating bell.

1,071,920. Dynamo - Electric Machine. A. Hill, assignor to Trier & Martin, Ltd., London, Eng. A self-regulating dynamo to give constant current over wide range of speed.

1,071,939. Apparatus for Scenic and Musical Effects. A. L. McMurtry, Sound Beach, Conn. In the scenic representation of musical notes there are means for causing electric sparks to jump across the face of the notes successively.

1,071,957. Electric-Light Adjuster. J. L. Rawson, New Bedford, Mass. A bracket with universal ball joint. (See cut on next page.)

1,071,978. Device for Removing Hairs. J. E. White, Rochester, N. Y. A pair of tweezers whose blades are insulated from each other and connected to opposite sides of an electric circuit.

1,072,014. Trolley Stand and Pole. A. C. Kudla, Meridan, Conn. Has adjustable blocks beneath the downwardly projecting feet of the pole.

1,072,030. Rail-Circuit-Closing Contact. F. Prochaska, assignor to Siemens & Halske A. G., Berlin, Germany. Beneath the rail is a pressure vessel containing mercury adapted to be driven upward into a circuit-closing chamber.

1,072,036. Armature - Winding for Electrical Machines with Commutators. R. Richter, assignor to Siemens-Schuckert-Werke, G. M. B. H., Berlin, Germany. Special resistance coils are included between the armature coils and their respective commutator segments.

1,072,042. Transformer Connection. K. Schmidt, assignor to General Electric Co. Comprises groups of transformer windings, a potential regulator, and means for short-circuiting certain groups and the regulator and for reversing their relation to the other groups.

1,072,066. Brake for Talking Machines. G. P. Wild, Philadelphia, Pa. Electromagnetically controlled brake bolt.

1,072,074. Push-Button System. W. Baxter, Jr., assignor to Otis Elevator Co., Jersey City, N. J. Relay-controlled automatic elevator system.

1,072,083. Motor - Controlling System. E. R. Carichoff, assignor to Otis Elevator Co. Automatic solenoid accelerating switches protect the motor from excess speed.

1,072,091. Process for Protecting Iron Surfaces From Corrosion. S. O. Cowper-Coles, London, Eng. Consists in subjecting the surface to an electrolytic bath containing zinc and iron salts, employing a low current to deposit iron, and then increasing the current to deposit a zinc-iron alloy.

1,072,096. Lighting System for Vehicles. C. A. Dean, Harvey, Ill. For automatically electrically lighting the door and step of a vestibuled car when the door is open.

1,072,120. Armature for Magneto-Induction Machines. G. Honold, assignor to Firm of Robert Bosch, Stuttgart, Germany. The coil-carrying part is at an angle to the shaft.

1,072,132. Accelerating Device for Alternating-Current Motors. W. D. Lutz, assignor to Otis Elevator Co. An inductive winding in one of the motor leads varies its inductive effect inversely as the speed of the motor.

1,072,138. Speed-Regulator for Traction Elevators. E. S. Matthews, assignor to Otis Elevator Co. Includes a main and an auxiliary motor and a retarding device.

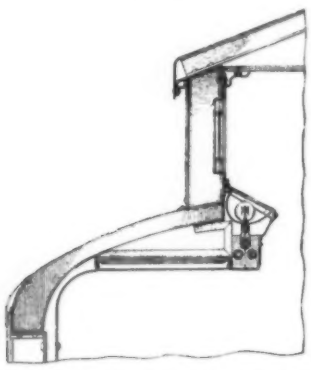
1,072,152. Means for the, Systematic Control of Electric Circuits by Light-Rays. S. Ocampo, New York, N. Y. Apparatus for reproducing figures from a stencil consists of a board containing a number of units, the resistance of which is effected by the throwing of light thereon, electric connections from the units and a board having a number of lights thereon, at least one light for each unit.

1,072,154. Culinary Apparatus. E. J. Ovington, assignor to Simplex Electric Heating Co., Cambridge, Mass. An immersion electric coffee percolator.

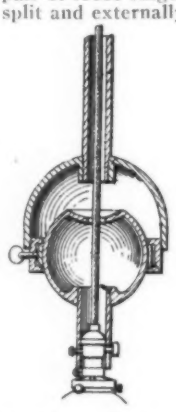
1,072,170. Electric Cooking Device. C. E. Sargent, Chicago, Ill. A cooker on the fireless principle has an air-tight inner chamber, at the side of which is a pressure piston connected to the switch to cut off the current when a certain pressure is reached. (See cut.)

1,072,177. Circuit-Breaker for Electric Circuits. F. L. Sessions, assignor to Jeffrey Mfg. Co., Columbus, O. Covers details of the operating mechanism of a laminated contact breaker.

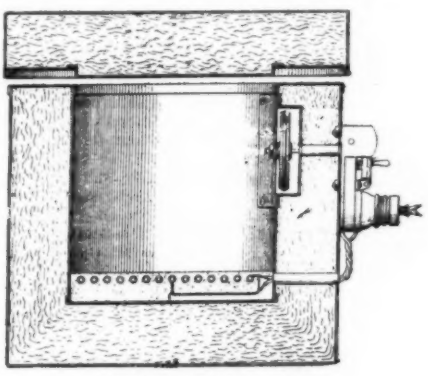
1,072,178. Circuit-Breaker. F. L. Sessions, assignor to Jeffrey Mfg. Co. Covers further details.



1,071,851.—Indirect Lighting of Cars.



1,071,957.—Electric-Light Adjuster.



1,072,170.—Electric Cooker.

1,072,222. Electric Rat-Exterminator. H. A. Gentzel, New Brighton, Pa. Has bare electric terminals on the top face of a counterbalanced trap door.

1,072,224. Switch Handle. G. W. Goodridge, assignor to Perkins Electric Switch Mfg. Co., Bridgeport, Conn. Comprises a metallic shell and a spring surrounding the stem.

1,072,227. Electric Heater. F. J. Holmes, assignor to Vulcan Electric Heating Co., Chicago, Ill. A curling iron with resistance wire wound about an insulated metallic core.

1,072,228. Armature for Magneto-Induction Machines. G. Honold, assignor to firm of Robert Bosch. A modification of No. 1,072,120.

1,072,252. Trolley-Pole and Brake Control. J. E. Peck, Logan, W. Va. The pole is pneumatically controlled and connected to the air-brake system so as to apply the brakes whenever the pole is being raised or lowered.

1,072,271. Electric-Lamp Socket. G. B. Thomas, assignor to Bryant Electric Co., Bridgeport, Conn. Covers details of the pull-switch mechanism.

1,072,276. Magnetic Separator. G. Ullrich, Magdeburg, Germany. A number of stationary poles are arranged around a common axis about which is a rotating guard and an annular counterpole.

1,072,277. Apparatus for the Magnetic Separation of Ores and Other Material. G. Ullrich. Provides means for producing a number of magnetic fields on a circle about a vertical axis, there being in each field two stationary poles of which the upper one is partly adjustable.

1,072,279. Starter Apparatus and System for Autovehicles. R. Varley, assignor to Varley Duplex Magnet Co., Jersey City, N. J. A starting motor is geared to the engine until the first explosive stroke takes place.

1,072,298. Target Apparatus for Use with Kinematographs. B. W. Bates, H. W. Kelly and D. H. Corbin, assignors to Life Targets, Ltd., London, Eng. Contacts on the film control relays that arrest the picture-projecting apparatus when a shot is fired.

1,072,346. Gramophone. G. Meling, Chicago, Ill. Electromagnetic means for raising the reproducer from the record.

1,072,379. Pipe Union or Coupling for Electric-Conduit Junction-Boxes and Other Purposes. H. M. Bigwood and F. H. Terry, Wolverhampton, England. Includes a socket internally tapered, a pair of loose rings each longitudinally split and externally tapered, one ring fitting within the taper of the socket and the other within the taper of a nut.

1,072,383. Electric Train-Controlled System for Railways. F. T. Jones, assignor to Jones Safety Train Control System, Baltimore, Md. Inclues track rails insulated from each other to form a series of electrically independent track sections, a separate current supply for each section and a short signal rail adjacent every other track section.

1,072,396. Locomotive. R. E. Noble, assignor to Morgan-Gardner Electric Co., Chicago, Ill. Electric mining locomotive.

1,072,400. Automatic Battery Cutout for Telephone Circuits. A. R. Nelson, Janesville, Cal. For a substation set.

1,072,404. Electric Signaling on Railways. G. H. Brown, Belfast, Ireland; K. M. Brown, H. Brown and G. B. Brown, executors said G. H. Brown, deceased. Includes a ramp rail on the track and a trolley on the engine adapted to engage this rail.

1,072,410. Machine for Trimming Commutators. H. E. Chappell, assignor to Phillips Mfg. Co., New York, N. Y. Includes a rotary abrading wheel and means for moving the wheel transversly across a commutator.

Patents That Have Expired.

Following is a list of electrical patents (issued by the United States Patent Office) that expired September 8, 1913.

567,132. Telephone Transmitter. R. P. Green, Columbus, O.

567,133. Trolley-Wire Crossing. H. M. Handshy, San Antonio, Tex.

567,137. Automatic Circuit-Breaker. E. M. Hewlett, Schenectady, N. Y.

567,170. Telephone Switch. D. Rousseau, New York, N. Y.

567,176. Contact Device for Electric Burglar-Alarms. P. Unger, Lemont, Ill.

567,197. Constant-Potential Alternating Generator. E. W. Rice, Jr., Schenectady, N. Y.

567,211. Electrical Train-Signaling Device. J. E. Young and E. S. Norton, Conneaut, O.

567,227. Electric Arc Lamp. E. F. G. H. Faure and J. MacHaffie, Schenectady, N. Y.

567,237. Electrical Transformer. H. M. Hobart, Boston, Mass.

567,247 and 567,248. Electric Heater. J. E. Meek, New York, N. Y.

567,250. Electrical Transformer. W. S. Moody, Lynn, Mass.

567,256. Electric Type-Setting Machine. J. Sachs, New York, N. Y.

567,257. Electric Rail-Bond. G. H. Scott, Worcester, Mass.

567,306 and 567,307. Electric-Railway Trolley. R. N. Dyer, East Orange, N. J.

567,322. Safety Device for Hanging Electric Arc Lamps. E. P. Snowden, St. Joseph, Mo.

567,324. Telephone Transmitter. A. Stromberg and A. Carlson, Chicago.

567,338. Electric Signal Lamp. J. R. Farmer, St. Louis, Mo.

567,381 and 567,382. Magnetic Separator. R. Eickemeyer, Yonkers, N. Y.

567,404. Apparatus for Telephone Switchboards. F. R. McBerty, Downer's Grove, Ill.

567,411. Trolley. E. D. Priest, Schenectady, N. Y.

567,418. Power Gearing for Trucks. E. A. Sperry, Cleveland, O.

567,423. Dynamo-Electric Machine. R. Thury, Geneva, Switzerland.

567,424. Transformer for Electric Currents. R. Thury.

567,474. Trolley for Electric Cars. J. E. Hewes, Philadelphia, Pa.

567,517. Electric Railroad. C. Sill, New York, N. Y.

567,531. Holder for Electric Lamps. W. S. Arnold, San Francisco, Cal.

567,540. Electric Railway. W. F. Grassler, Williamsport, Pa.

567,550. Swing for Electric-Light or Telephone Brackets. A. Petereit, New York, N. Y.